

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/EE/ET/ME/MT
PROGRAMME CODE	01/02/03/04/05
COURSE TITLE	BASIC MATHEMATICS
COURSE CODE	SC11205
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme						Credits	Paper Duration	Assessment Scheme										Total Marks
			Actual Contact Hrs./Week			SLH	NLH	Theory			Based on LL & TSL				Based on SL						
			CL	TL	LL			FA-TH			SA-TH	Total	Practical				SLA				
													FA-PR	SA-PR	SLA						
Max	Max	Max	Min	Max	Min	Max	Min	Max	Min												
SC11205	BASIC MATHEMATICS	AEC	4	2	-	-	6	3	3	30	70	100	40	-	-	-	-	-	-	100	

Total IKS Hrs for Term: 6 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, IKS – Indian Knowledge System, SLA- Self Learning Assessment

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

Note:

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in FA-PR (Formative Assessment - Practical) of any course, then the candidate shall be declared as 'Detained' in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as 'fail' and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are (CL + LL + TL + SL) hrs. * 15 Weeks
4. **1 credit** is equivalent to **30 Notional hours**.
5. * Self-learning hours shall not be reflected in the Timetable.
- 6.*Self-learning includes micro-projects/assignments/other activities.

II. RATIONALE:

Basic Mathematics plays a crucial role in diploma Programmes 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 move. Derivatives are useful for finding 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.

III. COURSE-LEVEL LEARNING OUTCOMES(CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

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

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-I ALGEBRA (CL Hrs-12, Marks-14)				
1.	TLO 1.1 Solve the given simple problem based on laws of logarithm. TLO 1.2 Solve the given system of linear equations using the matrix inversion method. TLO 1.3 Obtain the proper and improper partial fraction for the given simple rational function. TLO 1.4 Solve simultaneous equations by using concepts given in Ancient Indian Mathematics.	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 fractions based on the nature of factors and related Problems. 1.5 Algebra in Indian Knowledge System: Solution of simultaneous equations.	Improved Lecture Tutorial Assignment Demonstration Simulation	CO1

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-II TRIGONOMETRY (CL Hrs-16, Marks-14)				
2	<p>TLO 2.1: Apply the concept of Compound angle, allied angle, and multiple angles to solve the given simple engineering problem(s).</p> <p>TLO 2.2: Apply the concept of Sub-multiple angle to solve the given simple engineering-related problem(s).</p> <p>TLO 2.3: Apply the concept of factorization and de-factorization formulae to solve the given simple engineering problem(s).</p> <p>TLO 2.4: Investigate given simple problems by utilizing inverse trigonometric ratios.</p> <p>TLO 2.5: Use concepts given in Ancient Indian Mathematics for trigonometry to solve given problems.</p>	<p>2.1 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), and submultiples angles (without proof).</p> <p>2.2 Factorization and De factorization formulae (without proof).</p> <p>2.3 Inverse Trigonometric Ratios and related problems.</p> <p>2.4 Principal values and the relation between trigonometric and inverse trigonometric ratios.</p> <p>2.5 Trigonometry in Indian Knowledge System: The Evolution of Sine Function in India.</p> <p>2.6 Indian Trigonometry: Basic Indian Trigonometry - Introduction and Terminology (From Ancient Beginnings to Nilakantha).</p> <p>2.7 Trigonometry in Indian Knowledge System: Pythagorean triples in Sulabasutras.</p>	<p>Improved Lecture Tutorial Assignment Demonstration Simulation</p>	CO2
UNIT-III STRAIGHT LINE (CL Hrs-06, Marks-08)				
3	<p>TLO 3.1 Calculate the angle between given two straight lines.</p> <p>TLO 3.2 Formulate equation of straight lines related to given engineering problems.</p> <p>TLO 3.3 Identify the perpendicular distance from the given point to the line.</p> <p>TLO 3.4 Calculate the perpendicular distance between the given two parallel lines.</p> <p>TLO 3.5 Use geometry given in Sulabasutras to solve the given problems.</p>	<p>3.1 Straight line and slope of a straight line:</p> <ol style="list-style-type: none"> a. The angle between two lines b. Condition of parallel and perpendicular lines <p>3.2 Various forms of straight lines:</p> <ol style="list-style-type: none"> a. General form b. Slope-point form c. Slope-intercept form d. Two-point form e. Double intercept form <p>3.3 Perpendicular distance from a point on the line</p> <p>3.4 Perpendicular distance between two parallel lines</p> <p>3.5 Geometry in Sulabasutras in Indian Knowledge System:</p> <ol style="list-style-type: none"> a. Construction of square b. Circling the square 	<p>Improved Lecture Tutorial Assignment Demonstration Simulation</p>	CO3

Sr. No	Theory Learning Outcomes (TLO'S) assigned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT- IV DIFFERENTIAL CALCULUS (CL Hrs-16, Marks-20)				
4	<p>TLO 4.1: Solve the given simple problems based on functions.</p> <p>TLO 4.2: Solve the given simple problems based on rules of differentiation.</p> <p>TLO 4.3: Obtain the derivatives of composite, implicit, parametric, inverse, logarithmic, and exponential functions.</p> <p>TLO 4.4: Apply the concept of differentiation to find the given equation of tangent and normal.</p> <p>TLO 4.5: Apply the concept of differentiation to calculate maxima, minima, and radius of curvature for a given function.</p> <p>TLO 4.6: Familiar with the concept of calculus given in Indian Mathematics.</p>	<p>4.1 Functions and Limits: Concept of function and simple examples.</p> <p>4.2 Functions and Limits: Concept of limits without examples.</p> <p>4.3 Derivatives: Rules of derivatives such as sum, product, and quotient of functions.</p> <p>4.4 Derivatives: Derivative of composite functions (chain rule), implicit and parametric functions.</p> <p>4.5 Derivatives: Derivatives of inverse, logarithmic, and exponential functions.</p> <p>4.6 Applications of derivative: Second-order derivative without examples, equation of tangent and normal, maxima and minima, radius of curvature.</p> <p>4.7 Calculus in Indian Knowledge System: The Discovery of Calculus by Indian Astronomers.</p>	<p>Improved Lecture Tutorial Assignment Demonstration Simulation</p>	CO4
UNIT -V STATISTICS (CL Hrs-10, Marks-14)				
5	<p>TLO 5.1: Obtain the range and coefficient of range of the given grouped and ungrouped data.</p> <p>TLO 5.2: Calculate the mean and standard deviation of ungrouped and grouped data related to the given simple engineering problem(s).</p> <p>TLO 5.3: Determine the variance and coefficient of variance of given grouped and ungrouped data.</p> <p>TLO 5.4: Justify the consistency of given simple sets of data.</p>	<p>5.1 Range, coefficient of range of discrete and grouped data.</p> <p>5.2 Mean deviation and standard deviation from the mean of grouped and ungrouped data.</p> <p>5.3 Variance and coefficient of variance.</p> <p>5.4 Comparison of two sets of observation.</p>	<p>Improved Lecture Tutorial Assignment Demonstration Simulation</p>	CO5

V. 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	LLO 1.1: Solve simple problems of Logarithms based on given applications.	Logarithm and applications.	2	CO1
2	LLO 2.1: Solve elementary problems on Algebra of matrices for branch-specific engineering-related applications.	Algebra of matrices	2	CO1
3	LLO 3.1: Apply the concept of matrix to solve engineering problems.	Simultaneous Equations using the inversion method.	2	CO1
4	LLO 4.1: Apply the concept of matrix to solve engineering problems.	Matrix Inversion method to determine currents.	2	CO1
5	LLO 5.1: Apply the concept of matrix to solve engineering problems.	Inverse of a non-singular matrix.	2	CO1
6	LLO 6.1: Apply the concept of partial fractions to solve engineering problems.	Partial fractions.	2	CO1
7	LLO 7.1: Solve problems on Compound, Allied, multiple and sub-multiple angles for related shapes.	Compound, Allied, multiple, and sub-multiple angles.	2	CO2
8	LLO 8.1: Utilize the concept of trigonometry to solve engineering problems.	Factorization and de-factorization formulae.	2	CO2
9	LLO 9.1: Utilize the concept of trigonometry to solve engineering problems.	Inverse trigonometric ratios.	2	CO2
10	LLO 10.1: Solve branch-specific engineering problems under given conditions of straight lines.	Equation of straight lines using different forms.	2	CO3
11	LLO 11.1: Solve branch-specific engineering problems under given conditions of straight lines.	Perpendicular distance, distance between two parallel lines, and angle between two lines.	2	CO3
12	LLO 12.1: Solve branch-specific engineering problems under given conditions of straight lines.	Use of a straight line to calculate the speed, distance, and time of a moving object.	2	CO3
13	LLO 13.1: Apply the concept of derivative to solve engineering problems.	Derivatives of implicit functions and parametric functions.	2	CO4
14	LLO 14.1 - Apply the concept of derivatives to solve engineering problems.	Derivative of logarithmic and exponential functions.	2	CO4
15	LLO 15.1 - Apply the concept of the equation of tangent and normal to solve engineering problems.	Equation of tangent and normal.	2	CO4

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
16	LLO 16.1 - Apply the concept of maxima, minima, and radius of curvature to solve engineering problems.	Maxima, minima of function and radius of curvature.	2	CO4
17	LLO 17.1 - Apply the concept of the equation of tangent and normal to solve engineering problems.	Concept of tangent and normal to solve the given problems of Engineering Drawing.	2	CO4
18	LLO 18.1 - Apply the concept of maxima and minima to solve engineering problems.	Maxima and Minima to obtain optimum value.	2	CO4
19	LLO 19.1 - Apply the concept of the radius of curvature to solve engineering problems.	Radius of curvature.	2	CO4
20	LLO 20.1 - Utilize the concept of derivatives to solve engineering problems.	Use of derivative to find the slope of a bending curve.	2	CO4
21	LLO 21.1 - Use the concept of range and mean deviation to crack branch-specific problems.	Range, coefficient of range and mean deviation.	2	CO5
22	LLO 22.1 - Use the concept of standard deviation and coefficient of variance to crack branch-specific problems.	Standard deviation, coefficient of variation and comparison of two sets.	2	CO5
23	LLO 23.1 - Use the concept of standard deviation to crack branch-specific problems.	Standard Deviation for Concrete with the given data.	2	CO5
Note: 1.Take any15 tutorials out of 23 and ensure that all the units are covered. 2.Take the tutorial in a batch size of 20 to 30 students. 3.Give students at least 10 problems to solve in each tutorial.				

VI. SUGGESTED MICROPROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

Micro-project

NA

Assignment

NA

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr. No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Open-source software like SageMaths, MATHS3D, GeoGebra, Graph, DPLOT and Graphing Calculator (GraphEq2.13), ORANGE can be used for Algebra, Calculus, Trigonometry and Statistics respectively.	All

VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE
 (Specification Table)

Sr. No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Algebra	CO1	12	2	6	6	14
2	II	Trigonometry	CO2	16	2	6	6	14
3	III	StraightLine	CO3	6	2	2	4	8
4	IV	DifferentialCalculus	CO4	16	2	8	10	20
5	V	Statistics	CO5	10	2	6	6	14
Grand Total				60	10	28	32	70

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
1. Tests	1. End Term Exam

X. SUGGESTED COS- POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes*(PSOs)		
	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	PSO-3
CO1	3	1	-	1	-	1	1			
CO2	3	1	-	-	1	1	1			
CO3	3	-	-	-	-	-	-			
CO4	3	1	1	1	-	1	-			
CO5	3	2	1	1	1	1	1			

Legends:-High:03, Medium:02, Low:01, No Mapping:-
 *PSOs are to be formulated at the institute level.





XI. SUGGESTED LEARNING MATERIALS/BOOKS

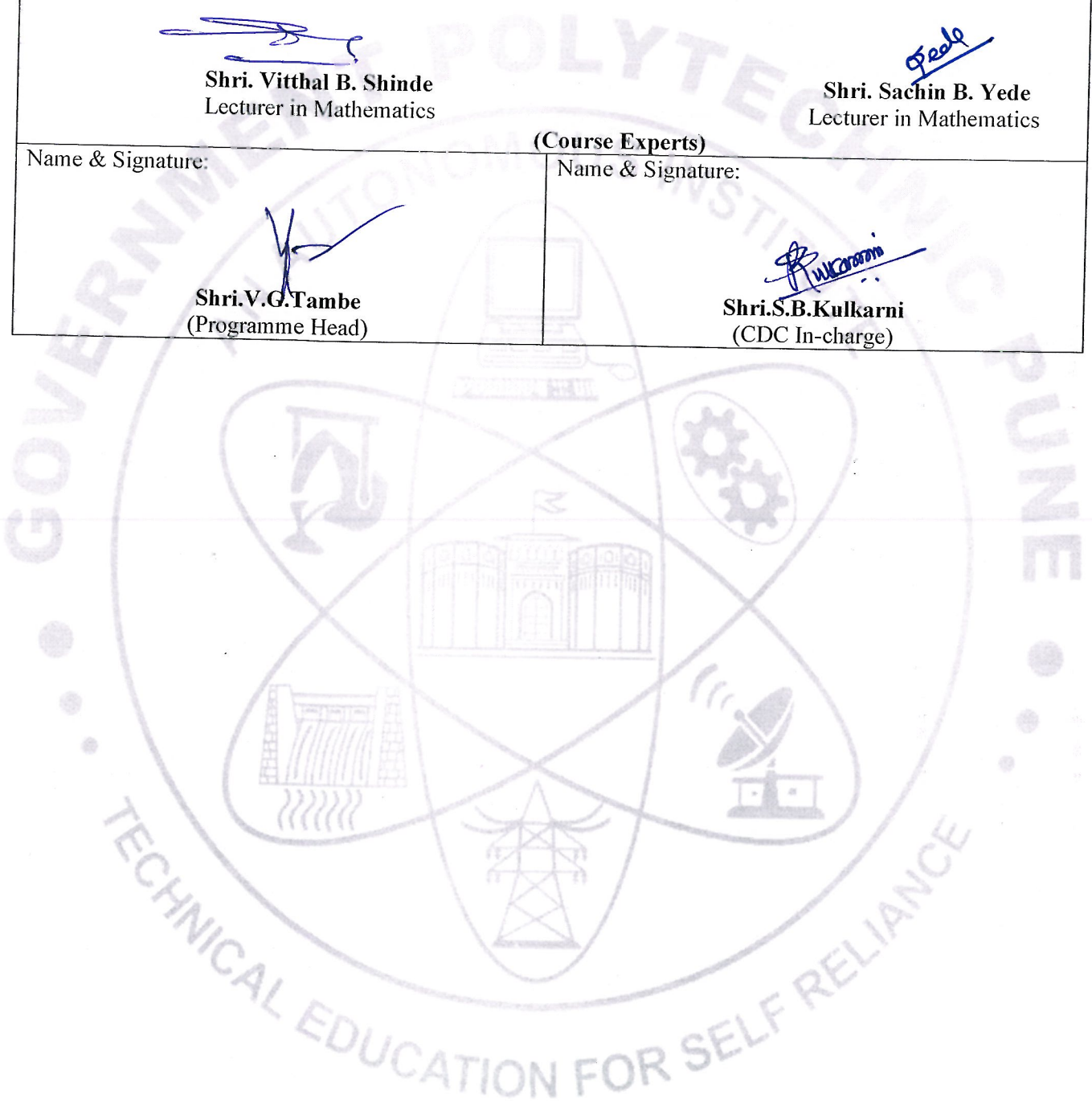
Sr. No	Author	Title	Publisher
1	Grewal B.S.	Higher Engineering Mathematics	Khanna publication New Delhi, 2013 ISBN: 8174091955
2	Dutta D.	A textbook of Engineering Mathematics	New Age publication New Delhi, 2006 ISBN: 978-81-224-1689-3
3	Kreyszig, Ervin	Advance Engineering Mathematics	Wiley publication 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

Sr. No	Author	Title	Publisher
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 to Modern Times	World Scientific Publishing Europe Ltd. 57 ISBN 978-17-86340-61-0
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 ISBN978-1-4614-7138-7 (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 January 2008 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

XIII. 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/-SCILab	Signal processing, statistical analysis and image enhancement.
3.	www.mathworks.com/product/matlab/-MATLAB	Applications of concepts of Mathematics to coding.
4.	Spreadsheet Applications	Use of Microsoft Excel, Apple Numbers and Google Sheets.
5.	https://ocw.mit.edu/	MIT Courseware
6.	https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig	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.

Name & Signature:	
 Shri. Vitthal B. Shinde Lecturer in Mathematics	 Shri. Sachin B. Yede Lecturer in Mathematics
(Course Experts)	
Name & Signature:	Name & Signature:
 Shri. V.G. Tambe (Programme Head)	 Shri. S.B. Kulkarni (CDC In-charge)



GOVERNMENT POLYTECHNIC, PUNE
'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE
PROGRAMME CODE	01
COURSE TITLE	CONSTRUCTION MATERIALS
COURSE CODE	CE21201
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
			Actual Contact Hrs./Week			SLH	NLH			Theory			Based on LL & TSL				Based on SL			
			CL	TL	LL					FA-TH	SA-TH	Total	Practical		SLA					
						FA-PR	SA-PR						SLA							
Max	Max	Max/Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min								
CE21201	CONSTRUCTION MATERIALS	DSC	3	0	2	1	6	3	3	30	70	100	40	25	10	25@	10	25	10	175

Total IKS Hrs for Term: 2Hrs

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

Legends: @-Internal Assessment, # - External Assessment, *# - Online Examination, @S - Internal Online Examination

Note:

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in FA-PR (Formative Assessment - Practical) of any course, then the candidate shall be declared as 'Detained' in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as 'fail' and will have to repeat and resubmit SLA work.
3. Notional learning hours for the semester are (CL + LL + TL + SL) hrs. * 15 Weeks
4. 1 credit is equivalent to 30 Notional hours.
5. * Self-learning hours shall not be reflected in the Timetable.
- 6.*Self-learning includes micro-projects/assignments/other activities.

II. RATIONALE:

Civil Engineering mainly deals with the design and construction of civil infrastructure (e.g. dams, embankments, roads, buildings and bridges) and the provision of services such as water supply and sewerage. Civil engineering projects involve the use of various materials for design and construction. It is commonly expected that diploma holders know these conventional and advanced materials to select the materials sensibly, determine the material properties, and effectively carry out the design and construction. With rapid economic development and the scarcity of natural materials, the use of synthetic materials, recycled materials, and eco-friendly materials and their combination with traditional materials has recently become more prevalent in civil engineering projects. Hence there is a growing need for Diploma civil engineers to learn these advanced materials in addition to traditional materials.

III. COURSE LEVEL LEARNING OUTCOMES(CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course based learning

- CO1:Identify relevant construction materials.
- CO2:Identify relevant natural construction materials.
- CO3:Identify relevant artificial construction materials.
- CO4:Select relevant special-type construction materials.
- CO5:Select relevant finishing materials for construction.
- CO6: Identify relevant processed construction materials.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes(TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-I INTRODUCTION OF CONSTRUCTION MATERIALS (CL Hrs.- 04, Marks-08)				
1	<p>TLO 1.1 Enlist Materials used in construction Works.</p> <p>TLO1.2Classify the given construction material according to source with examples.</p> <p>TLO1.3 Selection of construction materials according to Use.</p>	<p>1.1 List various materials used in the construction Industry.</p> <p>1.2 Classification of materials-sources: Natural, Artificial, Special and recycled.</p> <p>1.3 Selection of construction materials used in Building Construction, Transportation Engineering, Environmental Engineering, and Irrigation Engineering (applications only).</p>	Chalk and board, Demonstration of construction materials, site visit, PPT	CO1
UNIT-II NATURAL CONSTRUCTION MATERIALS (CL Hrs.- 12, Marks-16)				
2	<p>TLO2.1Describe the properties, types and uses of natural construction materials. e.g. Stone, Timber, Lime, Asphalt, Soil and Sand.</p> <p>TLO2.2Choose the relevant type of lime mortar for the given type of construction work with justification.</p> <p>TLO2.3Explain the given type of defects in timber.</p> <p>TLO2.4Explain the procedure of preservation of timber in the given situation.</p> <p>TLO2.5 Select the natural construction material for the given situation with justification.</p>	<p>2.1 Stone: Classification of Rocks, Requirements of good building stone, Criteria for selection of site for quarry.Purpose of dressing, uses of stones.</p> <p>2.2 Lime- Properties, types and uses.</p> <p>2.3 Timber: Structure of timber, Characteristics and uses of good timber, seasoning, preservation and defects in timber, use of bamboo in construction.</p> <p>2.4 Asphalt, bitumen and tar used in construction, properties and uses.</p> <p>2.5 Soil: types and suitability in construction.</p> <p>2.6 Sand: properties and uses.</p> <p>2.7 Classification of coarse aggregate according to Sizes and its uses.</p>	Chalk and board, Demonstration of construction materials, PPT, site visit.	CO2

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-III ARTIFICIAL CONSTRUCTION MATERIALS (CL Hrs.- 14, Marks-18)				
3	<p>TLO 3.1 Describe the properties, ingredients, uses and manufacturing process of the given type of brick.</p> <p>TLO 3.2 Select the relevant type of artificial construction material for the given type of construction work with justification.</p> <p>TLO 3.3 Select the type of precast concrete products for the given civil structure with justification.</p> <p>TLO 3.4 Select the relevant type of floor tiles for the given situation with justification.</p> <p>TLO 3.5 Select the relevant type of glass for the given type of construction work with justification.</p> <p>TLO 3.6 Select relevant types of ferrous and non-ferrous metal for the given type of construction work with justification.</p>	<p>3.1 Constituents of Brick earth, manufacturing process of burnt clay brick. Conventional / Traditional bricks, Modular and Standard bricks, Characteristics of good brick, Classification of burnt clay bricks and their suitability, Special bricks –fly ash bricks, Field tests on Bricks.</p> <p>3.2 Flooring tiles – Types, uses.</p> <p>3.3 The manufacturing process of cement-dry and wet (only flow chart), types of cement and its uses.</p> <p>3.4 Pre-cast concrete blocks- hollow, solid, pavement blocks, balustrades and their uses.</p> <p>3.5 Plywood, particle board, Veneers, laminated board and their uses.</p> <p>3.6 Types of glass: soda lime glass, lead glass and borosilicate glass and their uses.</p> <p>3.7 Ferrous and Non-Ferrous metals and their uses.</p>	<p>Chalk and board, Demonstration of construction materials, PPT, site visit.</p>	CO3
UNIT- IV SPECIAL CONSTRUCTION MATERIALS (CL Hrs.- 06, Marks-08)				
4	<p>TLO 4.1 Describe the methods used for thermal and sound insulation in the given situation.</p> <p>TLO 4.2 Select the relevant material required for the given operations with justification.</p> <p>TLO 4.3 Describe the fibres required for the given construction material.</p> <p>TLO 4.4 Select features of the given fibre which can be used as a construction material with justification.</p> <p>TLO 4.5 Describe the features of the given type of geopolymer cement.</p>	<p>4.1 Types of protective materials such as waterproofing materials, Damp Proofing Materials, Fireproofing Materials, and Termite Proofing materials.</p> <p>4.2 Types of Thermal and sound Insulation materials.</p> <p>4.3 Fibres – Types –Jute, Glass, Steel, Carbon, Plastic, Asbestos Fibers, (only uses).</p> <p>4.4 Geo polymer cement: Geo-cement: properties, uses and application.</p>	<p>Chalk and board, Demonstration of special materials, Field visit, PPT</p>	CO4

Sr. No	Theory Learning Outcomes (TLO's) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT –V FINISHING MATERIALS (CL Hrs.- 06,Marks-10)				
5	<p>TLO 5.1 Choose the relevant proportion adopted in mortars for the given type of construction work with justification.</p> <p>TLO 5.2 Select the relevant type of POP board for the given type of work with justification.</p> <p>TLO 5.3 Describe the properties of the given type of paint.</p> <p>TLO 5.4 Select the relevant type of paint to be used for the given situation with justification.</p> <p>TLO 5.5 Choose the relevant type of finishing material for the given situation with justification.</p>	<p>5.1 Lime Mortar, Cement Mortar, Special Mortars and their uses as a plastering material.</p> <p>5.2 Constituents and uses of POP (Plaster of Paris), POP finishing boards, sizes and uses.</p> <p>5.3 Paints- Oil Paints, Distempers, and Varnishes. (Situations where used).</p>	Chalk and board, Videos, site visit, PPT	CO5
UNIT –VI PROCESSED CONSTRUCTION MATERIALS (CL Hrs.- 06,Marks-10)				
6	<p>TLO 6.1 Describe the properties of the given industrial or agro-waste products used for the given type of work.</p> <p>TLO 6.2 Describe the salient properties of the given special construction material.</p> <p>TLO 6.3 Select the relevant processed construction material for the given situation with justification.</p>	<p>6.1 Industrial waste materials- Fly ash, Blast furnace slag, Granite and marble polishing waste and their uses.</p> <p>6.2 Agro waste materials - Rice husk, Bagasse, coir Fibers and their uses.</p> <p>6.3 Special processed construction materials: Geosynthetic, Ferrocete, Artificial timber, and artificial sand with their uses.</p>	Chalk and board, Demonstration, Industrial visit, PPT.	CO6

V. 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 Identify the construction materials based on their sources.	Identification of available construction materials in the laboratory/within campus/off campus.	02	CO1 TO CO6
2	LLO2 Market Survey of any five construction materials.	Market Survey of construction materials from various dealers/suppliers of the local market for different brands.	04	CO1, CO2, CO3, CO5
3	LLO3 Identify defects in the given sample of wood.	Identification of defects in a given sample of wood.	02	CO2

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
4	LLO4 Prepare the report on the slaking of lime.	Preparation of report on slaking of lime.	02	CO2
5	LLO5 Visit Marble Depot/stone Quarry site. (Any one).	Prepare a report of a site visit to the Marble depot or stone quarry site.	04	CO2
6	LLO6 Perform field tests on Bricks.	Perform field tests on Bricks.	02	CO3
7	LLO7 Select First Class, Second Class and Third Class bricks from the stake of bricks.	Prepare a report based on First Class, Second Class and Third Class bricks properties.	02	CO3
8	LLO8 Visit to Brick Kiln / Fly Ash Brick Manufacturing Plant Precast concrete blocks/paver blocks Manufacturing Plant.	Prepare a report on the manufacturing process of bricks /concrete blocks.	04	CO3
9	LLO9 Prepare a report about the specifications e.g. ceramic tiles, glazed tiles, mosaic tiles etc.	Prepare a report on different types of flooring tiles used in the construction Industry.	04	CO3
10	LLO10 Prepare a report about the specification.	Prepare a report on Thermal and sound insulation materials used in the construction Industry.	02	CO4
11	LLO11 Prepare a report about the specification.	Prepare a report on Natural and Artificial Fibers used in the construction Industry.	02	CO4
12	LLO12 Identify different types of Anti Termite Chemicals available in the market and write a report on them.	Prepare a report on Anti Termite Chemicals available in the market.	02	CO4
13	LLO13 Visit a site to see a demonstration of Painting to a plastered wall surface/preparation of false ceiling (POP) (Any one).	Prepare a report on the demonstration of Painting to a plastered wall surface/preparation of a false ceiling.	04	CO5
14	LLO14 Prepare the cement mortar using artificial sand as a specially processed construction material.	Preparation of cement mortar of proportion 1:3 or 1:6 using artificial sand as a specially processed construction material.	02	CO6
15	LLO15 Prepare mortar using cement and Fly ash or granite/ marble polishing waste.	Preparation of mortar using cement and Fly ash or granite/ marble polishing waste in the proportion 1:6 or 1:3.	02	CO6

Note :

A suggestive list of practical LLOs is given in the table. A judicious mix of a minimum of 12 or more practical LLOs needs to be performed. Hence, laboratory work is to be assessed according to a suggested sample of Performance Indicators (Weightage in %) as follows: 1) Preparation of experimental setup up 20% 2) Setting and operation 20% 3) Safety measures 10% 4) Observations and Recording 10% 5) Interpretation of result and Conclusion 20% 6) Answer to sample questions 10% 7) Submission of report in time 10%.

VI. SUGGESTED MICROPROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT(SELF-LEARNING)
Microproject:

- Geo Polymer Eco Bricks
- Sludge Ash Bricks
- Lightweight Construction Materials.
- Sugar Mill Waste is used as construction Materials.
- Industrial waste is used as construction materials.
- Bamboo as reinforcing material.
- Ferro cement products – Water Tank, Septic Tank.
- Autoclaved aerated concrete Block.

Assignment:

- Prepare journals consisting of sketches of construction materials.
- Inspect the various activities related to Construction materials at sites of different civil structures.
- Teacher-guided self-learning activities.
- Course/ library /internet-based mini-projects.
- A literature survey of available at the institute library regarding construction materials used for different purposes and situations.
- Develop a Power Point presentation or animation for demonstrating lying and fixing the construction materials.
- Seminar on any relevant topic related to construction materials.

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Weighing balance	4,6,7,14,15
2	Pan, spade	4,6,14,15
3	Steel Tape	6
4	Sample of Wood	3
5	Trowels (Brick, Buttering, Pointing), triangular, ranging in size up to about 11 inches (279.40 mm) long and from 101.6 mm to 203.2 mm wide i.e. (4 to 8 inches wide).	4,14,15
6	Portable Hammer, Spade, Pans (Ghamela), Thread, lime	4,6,14,15
7	Square, mason's level, and straightedge 28.57 mm to 38.10 mm and the middle portion of the top edge from 152.40 mm to 254 mm wide	6,7,8
8	Ordinary Portland Cement, PPC	14,15
9	Bricks and blocks of different sizes.	6,7,8,9
10	Fly ash or Granite/marble polishing waste	15

VIII.SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE
(Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction of Construction Materials	CO1	04	04	02	02	08
2	II	Natural Construction Materials	CO2	12	04	08	04	16
3	III	Artificial Construction Materials	CO3	14	06	08	04	18
4	IV	Special Construction Materials	CO4	06	00	04	04	08
5	V	Finishing Materials	CO5	06	02	04	04	10
6	VI	Processed Construction Materials	CO6	06	02	04	04	10
Grand Total				48	18	30	22	70

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
<ul style="list-style-type: none"> Two unit tests of 30 marks and an average of two unit tests. For laboratory learning 25 marks. 	<ul style="list-style-type: none"> End semester assessment of 25 marks for internal assessment End semester assessment of 70 marks theory examination.

X. SUGGESTED COS- POS- PSOs MATRIX FORM

Course Outcomes(COs)	Programme Outcomes(POs)							Programme Specific Outcomes*(PSOs)		
	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	PSO-3
CO1	3	1	2	2	3	2	3	1	3	2
CO2	3	2	1	2	3	2	3	1	3	1
CO3	3	2	1	2	3	2	3	1	3	1
CO4	3	2	1	2	3	2	3	1	3	1
CO5	3	2	1	2	3	2	3	1	3	1
CO6	3	2	1	2	3	2	3	1	3	1

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

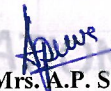
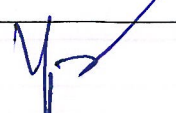

*PSOs are to be formulated at the institute level

XI. SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No	Author	Title	Publisher
1	Ghose, D. N.	Construction Materials	Tata McGraw Hill, New Delhi, 2014 ISBN: 9780074516478
2	Varghese, P.C.	Building Materials	PHI Learning, New Delhi, 2014 ISBN: 8120328485
3	Rangwala, S.C.	Engineering Materials	Charator publisher, Ahemdabad, 2015, ISBN: 9789385039171
4	Somayaji, Shan	Civil Engineering Materials	Pearson Education, New Delhi, 2015 ISBN: 9788131766316
5	Rajput, R.K	Engineering Materials	S. Chand and Co., New Delhi, 2015 ISBN 8121919606
6	Sharma	Engineering Materials	PHI Learning, New Delhi, 2015 ISBN: 812032448X
7	Duggal, S. K.	Building Materials	New International, New Delhi, 2014 ISBN: 8122414354

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	www.nptel.com	Basics of construction materials.
2.	https://www.quora.com/What-is-geocement	Concept of geocement.
3.	http://apis-cor.com/en/about/blog/geocement-new-generation-hightech-material	Geocement as construction material.
4.	http://www.nbmcw.com/concrete/10827-geopolymer-concrete-a-new-eco-friendly-material-of-construction.html	Geopolymer concrete is an eco-friendly construction material.
5.	https://www.youtube.com/watch?v=1fc4NVP9wXk	The manufacturing process of clay bricks.
6.	https://www.youtube.com/watch?v=m8U76Bm8kDY	Cement manufacturing process.
7.	https://www.youtube.com/watch?v=IORIZ1shRIM	The art of laying brick.
8.	https://www.youtube.com/watch?v=Xf89KDibIFE	Cement plaster

Name & Signature:		
 Mrs. A.P. Shinde Lecturer in Civil Engineering (Course Experts)		
Name & Signature:	Name & Signature:	Name & Signature:
 Shri. V.G. Tambe (Programme Head)	 Shri. S.B. Kulkarni (CDC In-charge)	

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/ ME/ MT
PROGRAMME CODE	01/04/05
COURSE TITLE	ENGINEERING CHEMISTRY
COURSE CODE	SC11201
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
			Actual Contact Hrs./Week			SLH	NLH			Theory	Based on LL & TSL				Based on SL					
			CL	TL	LL						FA-TH	SA-TH	Total	Practical		SLA				
						Max	Min			Max				Min	Max	Min	Max	Min		
SC11201	ENGINEERING CHEMISTRY	DSC	03	-	02	01	06	03	02	30	70*#	100	40	25	10	25@	10	25	10	175

Total IKS Hrs for Term: 2 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, IKS – Indian Knowledge System, SLA- Self Learning Assessment

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

Note:

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in FA-PR (Formative Assessment - Practical) of any course, then the candidate shall be declared as 'Detained' in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as 'fail' and will have to repeat and resubmit SLA work.
3. Notional learning hours for the semester are (CL + LL + TL + SL) hrs. * 15 Weeks
4. 1 credit is equivalent to 30 Notional hours.
5. * Self-learning hours shall not be reflected in the Timetable.
- 6.* Self-learning includes micro-projects/assignments/other activities.

II. RATIONALE:

Applications of Material Science and Chemical Principles have resulted in the development of new materials used in modern medicines and automobiles, synthetic fibers, polymers, alloys, new energy sources and many other important products and processes. Steels, alloys, plastic and elastomers are included considering their present extensive use in automobiles, chemicals and heavy engineering industries.

Corrosion and methods of prevention will make students realize the importance of care and maintenance of machines and equipment. The study of impurities and hardness in water and methods for water softening will help the students make proper use of water.

III. COURSE-LEVEL LEARNING OUTCOMES (CO's)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

- CO1: Distinguish materials based on atomic structure.
- CO2: Select metals and non-metals for given applications
- CO3: Use corrosion preventive measures in the industry.
- CO4: Use relevant water treatment processes to solve industrial problems.
- CO5: Select relevant fuel and lubricant in relevant applications.
- CO6: Use the appropriate engineering material in various applications.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-I ATOMIC STRUCTURE (CL Hrs-05, Marks-10)				
1.	<p>TLO 1.1 Explain the characteristics of fundamental particles</p> <p>TLO 1.2 Distinguish between orbit and orbital.</p> <p>TLO 1.3 Draw orbital electronic configurations (s, p, d, f) of elements.</p> <p>TLO 1.4 Explain the formation of molecules</p> <p>TLO 1.5 Explain the Covalent compounds.</p>	<p>1.1 Indian Chemistry:-Philosophy of an atom by Acharya Kanad.</p> <p>1.2 Orbits: Bohr's energy levels, sub-energy levels, s, p, d, f orbital, shapes and description of s and p orbital.</p> <p>1.3 Aufbau's principle, Hund's rule, orbital electronic configurations (s, p, d, f) of elements having atomic numbers 1 to 30</p> <p>1.4. Definitions of valence electrons, valency, types of valencies, Definition of electrovalency positive and negative electrovalency.</p> <p>1.5. Formation of Electrovalent compounds-NaCl, AlCl₃ Definition of covalency, single, double and triple covalent bonds, formation of Covalent compounds H₂O, CO₂, N₂</p>	<p>Chalk and board Improved lecture, Tutorial Assignment, and Demonstration</p>	CO1
UNIT-II METALS AND ALLOYS (CL Hrs-08, Marks-12)				
2.	<p>TLO 2.1 Draw the flow chart showing different processes in metallurgy.</p> <p>TLO 2.2 Classify carbon steel giving properties and application of each type.</p> <p>TLO 2.3 Define heat treatment and state the purposes of the hardening method.</p> <p>TLO 2.4 Describe the purposes of making alloys.</p> <p>TLO 2.5 State the composition, properties and uses of a given alloy.</p>	<p>2.1 Occurrence of metals, definitions of mineral, ore, flux, matrix, slag and metallurgy, mechanical properties of metal.</p> <p>2.2 Flow chart showing different processes in metallurgy, classification, properties and application of carbon steel,</p> <p>2.3 Heat treatment (definition, purposes and methods)</p> <p>2.4 Definition of alloy, purposes of making alloys with examples, classification of alloys (ferrous and non-ferrous),</p> <p>2.5 Composition, properties and uses of Heat resisting steel, Magnetic steel, Shock resistance steel, Stainless steel, High-speed steel, Spring steel, Tool steel, Duralumin, Woods metal, Brass and Monel metal</p>	<p>Chalk and board, Improved lecture, Tutorial Assignment, Demonstration</p>	CO2

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-III CORROSION (CL Hrs-08, Marks-12)				
3	<p>TLO 3.1 Explain different types of oxide films.</p> <p>TLO 3.2 Explain the mechanism of electrochemical corrosion.</p> <p>TLO 3.3 Explain the factors affecting the rate of atmospheric corrosion and electrochemical corrosion.</p> <p>TLO 3.4 Describe the galvanization process of protection of metal from corrosion.</p> <p>TLO 3.5 Distinguish between galvanization and tinning.</p>	<p>3.1 Definition, causes of corrosion types of corrosion- definition (atmospheric and electrochemical) Types of oxide films</p> <p>3.2 Mechanism of atmospheric and electrochemical corrosion (evolution of hydrogen, absorption of oxygen).</p> <p>3.3 Factors affecting the rate of atmospheric corrosion and electrochemical corrosion.</p> <p>3.4 Protection Methods- Galvanization and Tinning Processes,</p> <p>3.5 Sherardizing Metal spraying, Metal cladding.</p>	<p>Chalk and board, Improved lecture, Tutorial Assignment, Demonstration</p>	CO3
UNIT- IV WATER (CL Hrs-08, Marks-12)				
4	<p>TLO 4.1. Explain the bad effects of hard water in the paper and textile industries.</p> <p>TLO 4.2. Describe the method of removal of hardness by the zeolite process.</p> <p>TLO 4.3. Explain the reverse osmosis process of water.</p> <p>TLO 4.4. Explain sewage treatment of water.</p> <p>TLO 4.5 Calculate the pH and pOH for a given solution</p>	<p>4.1 Definition of hard water and soft water causes of hardness, types of hardness.</p> <p>4.2 Bad effect of hard water in industries (paper, textile, dye, sugar)</p> <p>4.3 Removal of hardness by lime soda method, zeolite, Ion exchange method.</p> <p>4.4 Reverse osmosis, sewage treatment</p> <p>4.5 pH scale, applications of pH in engineering. Numerical based on pH.</p>	<p>Chalk and board, Improved lecture, Tutorial Assignment, Demonstration</p>	CO4
UNIT -V LUBRICANTS & FUELS (CL Hrs-08, Marks-12)				
5	<p>TLO 5.1 Classify lubricant and list the examples of each type.</p> <p>TLO 5.2 Select the proper lubricant for given machines, (I.C.E., gears, cutting tools, high pressure.)</p> <p>TLO 5.3 Describe the characteristics of good fuel.</p> <p>TLO 5.4 Compare solid, liquid and gaseous fuel</p> <p>TLO 5.5 Draw the diagram of refining of crude petroleum</p>	<p>5.1 Lubricants: Classification of lubricant, properties of lubricating oils (physical and chemical)</p> <p>5.2 Selection of lubricant for light machines, I.C.E., gears, cutting tools, high-pressure and low-speed machines, transformers, and spindles in the textile industry for refrigeration systems.</p> <p>5.3 Definition, classification of fuels, characteristics of good fuel.</p> <p>5.4 Comparison between solid, liquid and gaseous fuel, types of coal. Proximate analysis of coal.</p> <p>5.5 Refining of crude petroleum. Fractions obtained by distillation of</p>	<p>Chalk and board, Improved lecture, Tutorial Assignment, Demonstration</p>	CO5

		crude oil, gasoline, kerosene, and diesel as a fuel (properties and uses).		
UNIT –VI MATERIALS (CL Hrs-08, Marks-12)				
6	<p>TLO6.1 Describe the different constituents of paint.</p> <p>TLO 6.2 Distinguish between varnish and paint.</p> <p>TLO 6.3 Describe the preparation and properties of a given insulator.</p> <p>TLO 6.4 Describe the polymerization process of the given polymer,</p> <p>TLO 6.5 Explain the properties and uses of the given polymer, elastomer.</p> <p>TLO 6.6 Explain the function of different constituents of cement.</p>	<p>6.1 Paints: Definition, the purpose of applying paints, characteristics of paint, constituents of paint, function and examples of each constituent.</p> <p>6.2 Varnish: Definition, types, and difference between varnish and paint.</p> <p>6.3 Insulators: Definition, characteristics, preparation, properties and application of Glass wool and Thermocole.</p> <p>6.4 Plastic: Definition, Classification based on Molecular structure, Monomers (homo polymer and copolymer), & Thermal behaviour (Thermoplastics and Thermosetting).</p> <p>6.5 Types Polymerization Reaction, Addition & condensation, properties and application of Polyethylene, Polyvinyl chloride, Teflon, Polystyrene, Phenol formaldehyde.</p> <p>6.6 Cement: Definition, classification of cement, chemical composition of Portland cement, functions of constituents in cement.</p>	Chalk and board, Improved lecture, Tutorial Assignment, Demonstration	CO6

V. 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	LLO 1 Write the electronic configuration of atoms from Z=1 to Z=30	Write the electronic configuration of atoms from Z=1 to Z=30	2	CO1
2	LLO 2 Write the formation of compounds NaCl, AlCl ₃ , H ₂ O, CO ₂ , N ₂	Write the formation of compounds NaCl, AlCl ₃ , H ₂ O, CO ₂ , N ₂	2	CO1
3	LLO 3 Determine basic radical-given ionic solutions by performing the selective test	Determination of basic radical from given ionic solution	2	CO1
4	LLO 4 Determine acidic radical given ionic solutions by performing the selective test	Determination of acidic radical from given ionic solution.	2	CO1

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	xperiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
5	LLO 5 Determine the percentage of iron in a given steel sample by redox titration.	Determination of the percentage of iron in a given steel sample by redox titration.	2	CO2
6	LLO 6 Prepare phenol formaldehyde resin.	Preparation of phenol formaldehyde resin.	2	CO6
7	LLO 7 Determine the rate of corrosion of Aluminium in an acidic medium	Determination of the rate of corrosion of Aluminium in an acidic medium.	2	CO3
8	LLO 8 Determine the hardness of the given water sample by the EDTA method.	Determination of hardness of given water sample by EDTA method.	2	CO4
9	LLO 9 Determine the coefficient of viscosity using Ostwald's viscometer	Determination of the coefficient of viscosity using Ostwald's viscometer.	2	CO5
10	LLO 10 Determine moisture content from a given coal sample.	Determination of moisture content from a given coal sample.	2	CO5
11	LLO 11 Determine thinner content in oil paint.	Determination of thinner content in oil paint.	2	CO6
12	LLO 12 Preparation of corrosive medium for Aluminium at different temperature	Preparation of corrosive medium for Aluminium at different temperatures	2	CO3

VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

- Types of bonds: Prepare a chart and models displaying different types of bonds with examples.
- Metals and Alloys: Prepare a chart showing the Composition, properties application of Ferrous Alloys.
- Insulating materials: Prepare a chart including different synthetic Plastic and Rubber and list their uses.
- Lubricants: Prepare a chart including the Selection of lubricants for different machines.
- Water: Collect and analyse different water samples from different sources.
- Corrosion: Prepare a Chart displaying images of observed corrosion processes in the surrounding
- Materials: Collect information by library survey regarding engineering materials used in various industries.
- Engineering material: Collect information by library survey regarding engineering materials used in various industries.
- Fuels: Prepare a chart of Fractions obtained by distillation of crude oil.

Assignment:

- Explain covalent bonds and ionic bonds with examples
- Distinguish between paints and varnishes.
- Write the electronic configuration of atoms
- Write the formation of compounds NaCl, AlCl₃, H₂O, CO₂, N₂
- Compare Thermoplastics and Thermosetting
- State properties and applications thermocol and glass wool
- Explain types of alloys with examples.
- Demonstrate the Mechanism of the Hydrogen Evolution process.
- Write properties and applications of solid, semisolid and liquid lubricant.
- Write properties and applications of solid, liquid and gaseous fuels.

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Digital Hot Air Oven GR Lab temperature ranges from 100 to 250 ^o c	10,11
2.	Electronic balance with the scale range of 0.001 gm to 500 gm	All

VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

(Specification Table)

Sr. No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Atomic structure	CO 1	05	02	08	00	10
2	II	Metals and alloys	CO 2	08	02	04	06	12
3	III	Corrosion	CO 3	08	02	04	06	12
4	IV	Water	CO 4	08	02	04	06	12
5	V	Lubricants & Fuels	CO 5	08	04	02	06	12
6	VI	Materials	CO 6	08	02	04	06	12
Grand Total				45	14	26	30	70

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
1. Tests 2. Rubrics for COs 3. Assignment 4. Midterm Exam 5. Self-Learning 6. Term Work 7. Seminar/Presentation	1. End Term Exam 2. Micro-project

X. SUGGESTED COs- POs MATRIX FORM

Course Outcomes (COs)	Programme Outcomes(POs)							Programme Specific Outcomes *(PSOs)		
	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	PSO-3
CO1	3	-	-	-	2	-	1			
CO2	3	2	-	-	2	1	1			
CO3	3	-	-	2	-	-	1			
CO4	3	2	-	2	2	1	1			
CO5	3	2	-	2	1	1	1			
CO6	3	2	-	3	1	1	-			

Legends:- High:03, Medium:02, Low:01, NoMapping: -
*PSOs are to be formulated at the institute level

XI. SUGGESTED LEARNING MATERIALS/BOOKS

12	Author	Title	Publisher
1	Dara S.S. Umare S.S.	Engineering Chemistry	S. Chand and Co publication, New Delhi, 201, ISBN: 8121997658
2	Jain and Jain	Engineering Chemistry	Dhanpat Rai and Sons, New Delhi, 2015, ISBN: 9352160002
3	Vairam. S	Engineering Chemistry	Wiley Indian Pvt. Ltd, New Delhi, 2013 ISBN: 9788126543342
4	Agnihotri, Rajesh	Chemistry for Engineers	Wiley Indian Ptd.Ltd, New Delhi, 2014, ISBN: 9788126550784
5	Agrawal Shikha	Engineering Chemistry	Cambridge University Press, New Delhi, 2015 ISBN: 97811074764
6	George E.Totten, R J Shah SR Westbrook	Fuels and Lubricants Handbook	Published by ASTM with a product code of B-ASTM-002 ISBN of 978-0-8031-4551-1, and 1086 pages.

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	www.chemistryteaching.com	Physical, inorganic and organic chemistry.
2.	www.chemcollective.org	Virtual Labs, simulation
3.	www.chem1.com	Chemistry instruction and education
4.	www.onlinelibrary.wiley.com	Materials and corrosion
5.	www.rsc.org	Catalysis

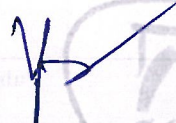
Sr.N	Link/Portal	Description
0		
6	www.chemcollective.org	Collection of virtual labs, scenario-based learning activities
7	www.wqa.org	Water Quality.
8	https://www.ancient-origins.net/history-famous-people/indian-sage-acharya-kanad-001399	IKS Philosophy of atom by Acharya Kanad.

Name & Signature:



Smt. Rupali S. Patil
Lecturer in Chemistry
(Course Expert)

Name & Signature:



Shri. V.G. Tambe
(Programme Head)

Name & Signature:



Shri. S.B. Kulkarni
(CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/EE/ET/ME/MT/CM/IT/DDGM
PROGRAMME CODE	01/02/03/04/05/06/07/08
COURSE TITLE	COMMUNICATION SKILLS (ENGLISH)
COURSE CODE	HU11201
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme						Credits	Paper Duration	Assessment Scheme										Total Marks
			Actual Contact Hrs./Week			SL	H	NLH			Theory			Based on LL & TSL				Based on SL			
			CL	TL	LL						FA-TH	SA-TH	Total	FA-PR		SA-PR		SLA			
														Max	Min	Max	Min	Max	Min		
HU11201	COMMUNICATION SKILLS (ENGLISH)	AEC	03	-	02	01	06	03	03	30	70	100	40	25	10	--	--	25	10	150	

Total IKS Hrs for Term: 0 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, IKS -- Indian Knowledge System, SLA- Self Learning Assessment

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

Note:

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in FA-PR (Formative Assessment - Practical) of any course, then the candidate shall be declared as 'Detained' in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as 'fail' and will have to repeat and resubmit SLA work.
3. Notional learning hours for the semester are (CL + LL + TL + SL) hrs. * 15 Weeks
4. 1 credit is equivalent to 30 Notional hours.
5. * Self-learning hours shall not be reflected in the Timetable.
- 6.* Self-learning includes micro-projects/assignments/other activities.

II. RATIONALE:

The most commonly used medium to express oneself is language. English is a global language used in all spheres of human life i.e. personal, professional and social. English Language proficiency focuses on strong reading, writing, speaking and listening skills. It will include grammar, vocabulary, comprehension and describing skills to enhance overall language proficiency. English for professional purposes aim to equip the students with the necessary language skills required for Public Speaking, presentation and negotiation. English for academic purposes will include academic writing skills and critical thinking considering the need of students to communicate in the engineering domain.

III. COURSE-LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

- CO1: Construct grammatically correct sentences in English.
- CO2: Compose paragraphs and dialogues on given situations.
- CO3: Comprehend passages correctly.
- CO4: Use contextual words in English appropriately.
- CO5: Deliver effective presentations in English using appropriate body language.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes (TLO's) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT I VOCABULARY (CL Hrs. -10, Marks-12)				
1.	TLO 1.1 Use transcription to pronounce words correctly. TLO 1.2 Use prefixes and suffixes for flexibility and precision in language. TLO 1.3 Employ synonyms and antonyms to express similarity and contrast between words. TLO 1.4 Use Homophones to expand their vocabulary. TLO 1.5 Make use of the collocations correctly.	1.1 Phonetics: Vowels (12), Consonants (24), Diphthongs (8) 1.2 Prefix & Suffix: Definition & Examples, List of common prefixes and suffixes 1.3 Synonyms & Antonyms: Vocabulary expansion, context & Usage 1.4 Homophones: Identifying Homophones, Meaning & Context, Vocabulary Expansion 1.5 Collocations: Definition & identification, types of collocations.	Language Lab Drill, Classroom learning, Reference Books & NPTEL.	CO1
UNIT II PARAGRAPH AND DIALOGUE WRITING (CL Hrs. -06, Marks-12)				
2.	TLO 2.1 Formulate paragraphs with Synchronized sentence structure on the given situation/topic. TLO 2.2 Develop dialogues to practice language skills in a structured and meaningful way.	2.1 Types of paragraphs: Technical, Descriptive and Narrative 2.2 Dialogue Writing: i. Greetings ii. Development iii. Closing Sentence.	Classroom learning Skit, Language Lab, YouTube & videos	CO2
UNIT III COMPREHENSION - SEEN AND UNSEEN PASSAGES (CL-Hrs. - 16, Marks-24)				
3.	TLO 3.1 Respond to the given questions of the specified passage. TLO 3.2 Formulate sentences using new words TLO 3.3 Use correct syntax to construct meaningful sentences for the given situation. TLO 3.4 Interpretation of passages in written and Spoken Form.	3.1 Passages from MSBTE workbook 1. Say No to Plastic bags 2. Interview of Dr. APJ Abdul Kalam 3. Maximum Achievements 4. Be Remarkable 5. Arunima Sinha: A Biography 6. Roses of Gratitude 3.2 Importance of Comprehension 3.3 Unseen Passages 3.4 Interpretation of passages in written and Spoken Form.	Classroom learning, interactive sessions & discussion	CO3

UNIT- IV COMMUNICATIVE LANGUAGE (CL-Hrs. -07, Marks-14)			
4.	<p>TLO 4.1 Describe technical objects with specifications.</p> <p>TLO 4.2 Explain the given picture in grammatically correct language.</p> <p>TLO 4.3 Diary Entry on situations.</p> <p>TLO 4.4 Translate from English to Marathi/Hindi- and vice versa.</p>	<p>4.1 Technical objects: i. Heading ii. Description of Technical objects.</p> <p>4.2 Picture Description: i. Situational picture. ii. Describe in your own words</p> <p>4.3 Diary Entry : i. Date ii. Content iii. Name of the writer</p> <p>4.4 Translation of paragraph from English to Marathi/Hindi-Vice versa (Question not to be asked on Translation in Theory Examination)</p>	<p>Language Lab, Pictures on situations and classroom learning.</p> <p>CO4</p>
UNIT- V PRESENTATION SKILLS (CL Hrs. - 06, Marks- 08)			
5.	<p>TLO 5.1 Cultivate/Develop the habit of being presentable</p> <p>TLO 5.2 Formulate speeches for occasions</p> <p>TLO 5.3 Prepare PowerPoint presentation</p> <p>TLO 5.4 Use appropriate body language for effective communication</p>	<p>5.1 Dressing & Grooming : i. Dressing for the occasion, ii. Proper grooming</p> <p>5.2 Speech Writing: i. Situation ii. Salutations iii. Introduction of the topic iv. Description/Body v. Conclusion</p> <p>5.3 PowerPoint Presentation: i. Layout ii. Font size iii. Colour combination</p> <p>5.4 Kinesics : i. Facial expressions ii Eye contact iii Postures iv Gestures</p>	<p>Classroom Learning & Language Lab.</p> <p>CO5</p>

V. 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	<p>LLO 1.1 Use transcription in the correct form.</p> <p>LLO 1.2 Learn to differentiate vowels, diphthongs and consonants.</p>	Write 20 words using phonetic transcription.	2	CO1
2	LLO 2.1 Learn the correct pronunciation by using headphones in the language lab.	Practice pronunciation as per IPA using language lab.	2	CO1

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
3	LLO 3.1 Enhance the understanding of word formation. LLO 3.2 Enrich word power. LLO 3.3 Construct words with the specific meanings.	Formulate 20 words using Prefix and Suffix.	2	CO1
4	LLO 4.1 Use words and phrases effectively. LLO 4.2 Enrich vocabulary. LLO 4.3 Develop overall language skills.	Construct sentences using 20 collocations.	2	CO1
5	LLO 5.1 Articulate ideas clearly and effectively. LLO 5.2 Improve grammar and punctuation.	Write two paragraphs of 75 words each.	2	CO3
6	LLO 6.1 Add depth to narratives. LLO 6.2 Form grammatically correct sentences.	Compose situational dialogues. (Any Two)	2	CO3
7	LLO 7.1 Promote the development of effective communication skills. LLO 7.2. Improve non-verbal communication Skills. LLO 7.3 Enhance interpersonal skills. LLO 7.4 Build confidence.	Enact Role Plays as per situation and context.	2	CO5
8	LLO 8.1 Acquire the ability to convey complex ideas clearly and concisely. LLO 8.2 Expand technical vocabulary. LLO 8.3 Enhance the written communication Skills.	Describe any three technical objects using correct grammar.	2	CO1 CO3
9	LLO 9.1 Develop storytelling skills. LLO 9.2 Connect with the audience.	Narrate anecdotes of various situations in English.	2	CO5
10	LLO 10.1 Notice and articulate specific elements, colours, shapes, & other visual aids. LLO 10.2 Express observations & interpretations clearly and concisely. LLO 10.3 Enhance vocabulary.	Describe a given picture. (Any Two)	2	CO1 CO4
11	LLO 11.1 Express information coherently and engagingly. LLO 11.2 Build confidence.	Introduce oneself and others.	2	CO5

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
12	LLO 12.1 Present complex information in a clear & concise manner. LLO 12.2 Develop public speaking skills and presentation skills.	Prepare a PowerPoint presentation on a given topic.	2	CO5
13	LLO 13.1 Improve language skills & expand vocabulary.	Translate paragraph --English to Marathi/Hindi (vice -Versa) (Any4)	2	CO1 CO3
14	LLO 14.1 Reflect on thoughts, feelings, and experiences.	Write your experience in 50 words on (Four) given situations (Diary Entry)	2	CO3 CO5
15	LLO 15.1 Develop language acquisition.	Respond to the questions based on the given passages.	2	CO2
16	LLO 16.1 Build confidence in public speaking. LLO 16.2 Enhance the skills in planning and prioritization.	Deliver oral presentations using correct grammar and appropriate body language.	2	CO5

Note: Note: Any 12 out of 16 practical's are compulsory.

VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

Micro project

- Report different types of episodes/anecdotes.
- Seminar preparation and presentations.
- Make a Podcast episode based on Indian Freedom Fighters.
- Summarize the editorial columns of English newspapers.
- Summarize the content of an eminent person's biography/autobiography. Write a review on the following: Short stories, Novels and Films.
- Prepare a booklet on the contribution of eminent Indian scientists.
- Prepare a podcast referring to Bhagwat Geeta.
- Prepare blogs, podcasts, vlogs.
- Prepare a questionnaire & conduct interviews of Industry Personnel, social workers, and entrepreneurs Prepare and participate in debates and extempore speeches.

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Language Lab with relevant software and Computer system with all necessary components like; motherboard, random access memory (RAM), Read-only memory (ROM), Graphics cards, sound cards, internal hard disk drives, DVD drive, network interface card	All
2	LCD Projector with document reader	All
3	Smart Board with networking	All

VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE
(Specification Table)

Sr. No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Vocabulary	CO1	10	2	4	6	12
2	II	Paragraph and Dialogue Writing	CO2	6	2	4	6	12
3	III	Comprehension (Seen and Unseen Passages)	CO3	16	5	6	13	24
4	IV	Communicative Language	CO4	7	2	4	8	14
5	V	Presentation Skills	CO5	6	2	2	4	8
Grand Total				45	13	20	37	70

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
1. Tests 2. Rubrics for COs 3. Assignment 4. Midterm Exam 5. Self-Learning 6. Term Work 7. Seminar/Presentation	1. End Term Exam 2. Micro-project 3. Tutorial Performance

X. SUGGESTED COS- POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes(POs)							Programme Specific Outcomes *(PSOs)		
	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	PSO-3
CO1	1	1	-	-	-	2	1			
CO2	1	1	-	-	-	2	1			
CO3	1	1	-	-	-	2	1			
CO4	1	1	-	-	-	2	1			
CO5	1	1	-	-	-	2	1			

Legends:- High:03, Medium:02, Low:01, No Mapping: -
*PSOs are to be formulated at the institute level


XI. SUGGESTED LEARNING MATERIALS/BOOKS


Sr. No	Author	Title	Publisher
1	MSBTE	Spectrum, G Scheme and I-Scheme	MSBTE
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

XIII. 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/-SCILab	Signal processing, statistical analysis, and image enhancement.
3.	www.mathworks.com/product/matlab/-MATLAB	Applications of concepts of Mathematics to coding.
4.	Spreadsheet Applications	Use of Microsoft Excel, Apple Numbers, and Google Sheets.
5.	https://ocw.mit.edu/	MIT Courseware

Name & Signature:


Shri. V.V. Kulkarni
 Lecturer in English



Dr. S. P. Palve
 Lecturer in English

(Course Experts)

Name & Signature:


Shri. V.G. Tambe
 (Programme Head)

Name & Signature:


Shri. S.B. Kulkarni
 (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE / EE / ME / MT
PROGRAMME CODE	01/02/04/ 05
COURSE TITLE	ENGINEERING GRAPHICS
COURSE CODE	ME11201
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME:

Course Code	Course Title	Course Type	Learning Scheme					Credits	Paper Duration	Assessment Scheme								Total Marks		
			Actual Contact Hrs./Week			SLH	NLH			Theory	Based on LL & TSL				Based on SL					
			CL	TL	LL						FA-TH	SA-TH	Practical			SLA				
						Max	Min			Max			Min	Max	Min					
ME11201	ENGINEERING GRAPHICS	DSC	2	-	4	-	6	3	-	-	-	-	-	50	20	50@	20	-	-	100

Total IKS Hrs for Term: 2 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, IKS – Indian Knowledge System, SLA- Self Learning Assessment

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

Note:

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

- If a candidate is not securing minimum passing marks in FA-PR (Formative Assessment - Practical) of any course, then the candidate shall be declared as 'Detained' in that semester.
- If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as 'fail' and will have to repeat and resubmit SLA work.
- Notional learning hours for the semester are (CL + LL + TL + SL) hrs. * 15 Weeks
- 1 credit is equivalent to 30 Notional hours.
- * Self-learning hours shall not be reflected in the Timetable.
- * Self-learning includes micro-projects/assignments/other activities.

II. RATIONALE:

Engineering graphics is the language of engineers. The concepts of graphical language are used in expressing the ideas and conveying the instructions, which are used in carrying out the jobs on the sites, shop floor etc. This course is useful in developing drafting and sketching skills in the student. It covers the knowledge & use of drawing instruments & also familiarizes the learner with the Bureau of Indian standards related to engineering drawing. The curriculum aims to develop the ability to draw and read various engineering curves, projections and dimensioning styles. The subject mainly focuses on the use of drawing instruments, developing imagination and translating ideas into sketches. This course also helps to develop the idea of visualizing the actual object or part based on drawings and blueprints. This preliminary course aims to build a foundation for further courses related to engineering drawing and other allied courses in the coming semesters.

III. COURSE-LEVEL LEARNING OUTCOMES (COs):

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

- CO1: Draw geometrical figures and engineering curves
- CO2: Apply principles of orthographic projections for drawing given pictorial views
- CO3: Apply principles of isometric projections for drawing given pictorial views
- CO4: Use various drawing codes, conventions and symbols as per IS SP-46 in engineering drawing.
- CO5: Draw free-hand sketches of given engineering elements.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-I BASIC ELEMENTS OF DRAWING (CL Hrs-04, Marks-04)				
1.	TLO 1.1 Prepare drawing using drawing instruments. TLO 1.2 Use IS SP-46 for dimensioning TLO 1.3 Use different types of lines. TLO 1.4 Draw regular geometrical figures. TLO 1.5 Draw figures having tangency constructions.	1.1 Drawing Instruments and supporting material: method to use them with applications. 1.2 Standard sizes of drawing sheets (ISO-A series) 1.3 I.S. codes for planning and layout. 1.4 Letters and numbers (single stroke vertical) 1.5 Convention of lines and their applications. 1.6 Scale - reduced, enlarged & full size 1.7 Dimensioning techniques as per SP-46 (Latest edition) – types and applications of chain, parallel and coordinate dimensioning 1.8 Geometrical constructions	Model Demonstration	CO1
UNIT-II ENGINEERING CURVES & LOCI OF POINTS (CL Hrs-06, Marks-12)				
2	TLO 2.1 Explain different engineering curves with areas of application. TLO 2.2 Draw different conic sections. TLO 2.3 Draw involute and cycloidal curves. TLO 2.4 Draw helix and spiral curves from the given data TLO 2.5 Plot Loci of points from given data.	2.1 Concept and understanding of focus, directrix, vertex and eccentricity. Conic sections. 2.2 Methods to draw an ellipse by Arcs of Circle method & Concentric circles method. 2.3 Methods to draw a parabola by Directrix-Focus method & Rectangle method 2.4 Methods to draw a hyperbola by Directrix-Focus method. 2.5 Methods to draw involutes: circle & pentagon 2.6 Methods to draw Cycloidal curve: cycloid, epicycloid and hypocycloid 2.7 Methods to draw Helix & Archimedean spiral. 2.8 Loci of points on Single slider crank mechanism with given specifications.	Demonstrations	CO1

UNIT-III ORTHOGRAPHIC PROJECTIONS (CL Hrs-08, Marks-14)				
3	<p>TLO 3.1 Explain methods of Orthographic Projections.</p> <p>TLO 3.2 Draw orthographic views of simple 2D entities containing lines, circles and arcs only.</p> <p>TLO 3.3 Draw the orthographic views from given pictorial views.</p> <p>TLO 3.4 Use of IS code IS SP-46 for dimensioning technique.</p>	<p>3.1 Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination)</p> <p>3.2 Introduction to orthographic projection, First angle and Third angle method, and their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection)</p>	<p>Model Demonstration Video Demonstrations</p>	<p>CO2, CO4</p>
UNIT- IV ISOMETRIC PROJECTIONS (CL Hrs-08, Marks-14)				
4	<p>TLO 4.1 Prepare isometric scale.</p> <p>TLO 4.2 Draw isometric views of simple 2D entities containing lines, circles and arcs only.</p> <p>TLO4.3 Interpret the given orthographic views.</p> <p>TLO 4.4 Draw Isometric views from given orthographic views.</p>	<p>4.1 Introduction to Isometric projection.</p> <p>4.2 Isometric scale and Natural Scale.</p> <p>4.3 Isometric view and isometric projection.</p> <p>4.4 Illustrative problems related to simple objects having plain, slanting, cylindrical surfaces and slots on slanting surfaces.</p> <p>4.5 Conversion of orthographic views into isometric View/projection.</p>	<p>Model Demonstration</p>	<p>CO3, CO4</p>
UNIT –V FREE HAND SKETCHES OF ENGINEERING ELEMENTS (CL Hrs-04, Marks-06)				
5	<p>TLO 5.1 Sketch proportionate freehand sketches of given machine elements.</p> <p>TLO 5.2 Select proper fasteners and locking arrangement.</p>	<p>5.1 Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washers, and Locking arrangements.</p>	<p>Model Demonstration</p>	<p>CO4, CO5</p>

V. 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	LLO 1.1 Use drawing instruments	Draw horizontal, vertical, 30°, 45°, 60° & 75° lines using mini drafter. (Sketch Book).	2	CO1

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
2	LLO 2.1 Use IS code related to dimensioning standard LLO 2.2 Draw the given types of lines	Draw different types of lines, and dimensioning styles (Sketch Book)	2	CO1
3	LLO 3.1 Draw the figure as per the given sketch	Draw one figure showing dimensioning techniques, two problems on redrawing the figures and one problem on loci of points - slider crank mechanism. (Sketch Book)	2	CO1
4	LLO 4.1 Draw figures using IS Standard for drawing	Draw one figure showing dimensioning techniques, two problems on redrawing the figures and one problem on loci of points - slider crank mechanism. (01 Sheet)	4	CO1
5	LLO 5.1 Identify different Engineering curves LLO 5.2 Draw different types of curves	Draw any Six Engineering Curves (Sketchbook)	2	CO1
6	LLO 6.1 Identify different Engineering curves LLO 6.2 Draw different types of curves	Draw any Six Engineering Curves – (01 Sheet)	4	CO1
7	LLO 7.1 Apply the method of projection for drawing simple orthographic views	Draw two problems on orthographic projections using the first angle method of projection having plain surfaces, slanting surfaces slots etc.- (Sketchbook)	2	CO2 CO4
8	LLO 8.1 Apply the method of projection for drawing simple orthographic views	Draw two problems on orthographic projections using the first angle method of projection having plain surfaces, slanting surfaces slots etc.- (01 Sheet)	4	CO2 CO4
9	LLO 9.1 Apply the method of projection for drawing complex orthographic views	Draw two problems on orthographic projections using the first angle method of projection having cylindrical surfaces, ribs etc. (Sketchbook)	2	CO2 CO4
10	LLO 10.1 Apply the method of projection for drawing complex orthographic views	Draw two problems on orthographic projections using the first angle method of projection having cylindrical surfaces, ribs etc.- (01 Sheet)	4	CO2 CO4
11	LLO 11.1 Draw simple isometric projections	Draw two problems on the Isometric view of simple objects having plain and slanting surfaces by using natural scale. (Sketchbook)	2	CO3
12	LLO 12.1 Apply different scales for drawing isometric projections.	Draw two problems on the Isometric view of simple objects having plain and slanting surfaces by using natural scale. (01 sheet)	4	CO3

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
13	LLO 13.1 Draw simple isometric projections	Draw two problems on the Isometric Projection of objects having cylindrical surfaces and slots on slanting surfaces by using an isometric scale. (Sketchbook)	2	CO3 CO4
14	LLO 14.1 Apply different scales for drawing isometric projections	Draw two problems on the Isometric Projection of objects having cylindrical surfaces and slots on slanting surfaces by using an isometric scale. (01 sheet)	4	CO3 CO4
15	LLO 15.1 Draw Orthographic views of a given object.	Problem-Based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views (Sketchbook).	2	CO2 CO4
16	LLO 16.1 Draw standard discipline-oriented components using free hand.	Draw freehand Sketches of 12 different standard components (Sketchbook)	2	CO5
17	LLO 17.1 Draw standard discipline-oriented components using free hand.	Draw freehand Sketches of 12 different standard components (1 Sheet)	2	CO5
18	LLO 18.1 Collect information on an ancient Indian culture related to engineering graphics	Correlate ancient Indian sculptures, Indian temples, Monuments, etc. with Engineering Graphics	2	CO1 CO2 CO3 CO4 CO5

VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING):

Micro project: NA

Assignment: NA

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED:

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Drawing Table with Drawing Board of Full Imperial/ A1 size.	All
2	Models of objects for orthographic projections	7,8,9,10
3	Models/ Charts of objects mentioned in unit no. 5	16,17
4	Set of various industrial drawings being used by industries.	All
5	A set of drawing sheets mentioned in section 6.0 could be developed by experienced teachers and made available to the students as references/standards.	All

6	Drawing equipment and instruments required for practical - Mini Drafter, Set squares (45° and 30°-60°), Protractor, Drawing instrument box (containing set of compasses and dividers), Sketch books, Drawing sheets, Drawing pencils, Pencil sharpener, Eraser, Drawing pins/clips.	All
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VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE:
(Specification Table)

Sr. No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Basic Elements of Drawing	CO1	4	0	0	04	04
2	II	Engineering curves and loci of Points.	CO1	6	0	0	12	12
3	III	Orthographic projections	CO2,CO4	8	0	0	14	14
4	IV	Isometric projections	CO3,CO4	8	0	0	14	14
5	V	Free Hand Sketches of Engineering Elements	CO4,CO5	4	0	0	06	06
Grand Total				30	0	0	50	50

IX. ASSESSMENT METHODOLOGIES/TOOLS:

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
1. Tests 2. Rubrics for COs 3. Assignment 4. Midterm Exam 5. Self-Learning 6. Term Work 7. Seminar/Presentation	1. End Term Exam 2. Micro-project 3. Tutorial Performance

X. SUGGESTED COS- POS MATRIX FORM:

Course Outcomes (COs)	Programme Outcomes(POs)							Programme Specific Outcomes *(PSOs)		
	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	PSO-3
CO1	3	-	-	2	-	2	2			
CO2	3	-	-	2	-	2	2			
CO3	3	-	-	2	-	2	2			
CO4	3	-	-	2	-	2	2			
CO5	3	-	-	2	-	2	2			


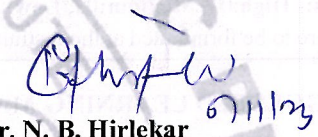
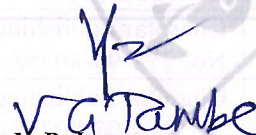
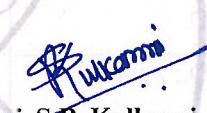
Legends:- High:03, Medium:02, Low:01, No Mapping: -
 *PSOs are to be formulated at the institute level

XI. SUGGESTED LEARNING MATERIALS/BOOKS:

Sr.No	Author	Title	Publisher
1	Bureau of Indian Standards.	Engineering Drawing Practice for Schools and Colleges IS: SP-46	Third Reprint, October 1998 ISBN No. 81- 7061-091-2
2	Bhatt, N.D.	Engineering Drawing	Charotar Publishing House, 2010 ISBN No. 978-93-80358-17-8
3	Bhatt, N.D.; Panchal, V. M	Machine Drawing	Charotar Publishing House, 2010 ISBN No. 978-93-80358-11-6
4	Jolhe, D.A.	Engineering Drawing	Tata McGraw Hill Edu. New Delhi, 2010, ISBN No. 978-0-07-064837-1
5	Dhawan, R. K.	Engineering Drawing	S. Chand and Company New Delhi, ISBN No. 81-219-1431-0
6	Pradhan, S.K Jain, K.K	Engineering Graphics	Khanna Book Publishing CO(P) LTD, New Delhi, ISBN No. 978-93-91505-50-9

XII. LEARNING WEBSITES & PORTALS:

Sr.No	Link/Portal	Description
1.	https://www.youtube.com/watch?v=dmt6_n7Sgcg	Free Hand Sketches
2.	https://www.youtube.com/watch?v=dmt6_n7Sgcg	Orthographic Projection
3.	https://www.youtube.com/watch?v=3WXPanCq9LI	Basics of Projection
4.	https://www.youtube.com/watch?v=fvjk7PlxAuo	Introduction to Engineering Graphics
5.	https://www.youtube.com/watch?v=8j711OWhMIE	Isometric Projection

Name & Signature:	
 Mr. Swapnil S. Hatwalane Lecturer in Mechanical Engineering	 Mr. N. B. Hirlekar Lecturer in Mechanical Engineering
(Course Experts)	
Name & Signature:	Name & Signature:
 Dr. V. B. Jaware (Programme Head)	 Shri. S.B. Kulkarni (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE
'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE
PROGRAMME CODE	01
COURSE TITLE	ENGINEERING WORKSHOP PRACTICE(CE)
COURSE CODE	WS11201
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Paper Duration	Assessment Scheme								Total Marks			
			Actual Contact Hrs./Week			SLH	NLH			Theory			Based on LL & TSL		Based on SL						
			CL	TL	LL					FA-TH	SA-TH	Total	Practical		SLA						
													FA-PR	SA-PR	SLA	SLA					
Max	Max	Max	Min	Max	Min	Max	Min	Max	Min												
WS11201	ENGINEERING WORKSHOP PRACTICE(CE)	SEC	-	-	4	-	4	2	-	CE	-	-	-	-	25	10	25@	10	-	-	100
										CW	-	-	-	-	25	10	25@	10	-	-	

Total IKS Hrs for Term:0 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, IKS – Indian Knowledge System, SLA- Self Learning Assessment

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

Note:

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

- If a candidate is not securing minimum passing marks in FA-PR (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
- If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
- Notional learning hours** for the semester are (CL + LL + TL + SL) hrs. * 15 Weeks
- 1 credit** is equivalent to **30 Notional hours**.
- * Self-learning hours shall not be reflected in the Timetable.
- *Self-learning includes micro-projects/assignments/other activities.
- Candidate is detained in any one part of Engineering Workshop Practice course i.e. Central Workshop ,Civil workshop will be declared as Detained in Engineering Workshop Practice course.
- Candidate remaining absent in practical examination of any one part of Engineering Workshop Practice course i.e. Central Workshop ,Civil workshop will be declare as Absent in Mark List and has to appear for examination. The marks of the part for which candidate was present will not be processed or carried forward.

II. RATIONALE:

General Civil Engineering Practices is a basic engineering course. The course of Civil Engineering Workshop practices would facilitate the opportunity to appreciate the basic construction activities that a Diploma holder is expected to perform Supervision of construction activities like brick masonry, woodwork, concerting, welding, plumbing etc. The knowledge of the basics of civil Engineering operations like Line out, Excavation, masonry, mixing, concreting, plumbing and finishing works is essential for a technician to perform his/her duties in industries. Therefore, an opportunity is created through this course to develop basic skills with the safety aspects required for the same. Students should be able to supervise construction activities use quality control techniques and maintain tools and equipment with safety to themselves, co-workers and the constructed components of the building. Working in the field develops the attitude of the team working and safety awareness, this course provides the unique experience of fieldwork.

This course aims to help the student attain the following industry-identified outcomes through various teaching-learning experiences: Perform the basic civil engineering operations using relevant tools and identifying appropriate materials, tools and equipment required for each construction activity. The course will develop awareness, knowledge & skills of various Civil Engineering practices with safety precautions and quality control at the construction site.

III. COURSE-LEVEL LEARNING OUTCOMES(CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

- CO1: Use the relevant type of firefighting equipment in the given situation.
- CO2: Undertake the various construction activities at the site.
- CO3: Perform the masonry work for the given situation.
- CO4: Carry out the specified Plumbing work in the given situation
- CO5: Prepare the simple job using relevant sheet metal tools.
- CO6: Use the relevant tools for the specified carpentry work.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes(TLO'S) Aligned to CO's.	Learning content mapped with TLO's.	Suggest Learning Pedagogies	Relevant COs
CIVIL ENGINEERING WORKSHOP				
UNIT-I SAFETY PRACTICES & PRECAUTIONS(CL Hrs-NIL, Marks-NIL)				
1.	<p>TLO 1.1: Explain the safety practices & precautions while operating firefighting equipment.</p> <p>TLO 1.2: Explain the procedure for using the given type of fire extinguisher.</p> <p>TLO 1.3: Justify the given type of firefighting equipment for the given situation.</p> <p>TLO 1.4: Prepare a list of equipment used for safety in Workshop operations.</p> <p>TLO 1.5: Maintain good housekeeping in the working area</p> <p>TLO 1.6: Prepare a layout of the workshop.</p>	<p>1.1. Safety Practices, Causes of accidents, General safety rules, Safety signs and symbols, and Safety Precautions.</p> <p>1.2. First Aid box and its constituent materials.</p> <p>1.3. Fire, Causes of Fire, Basic ways of extinguishing the fire. Classification of fire, Firefighting equipment, and fire extinguishers (Class A, B, C, D).(As per NBC 2016).</p> <p>1.4. Workshop Layout: Issue and return system of tools, equipment and consumables.</p>	<p>Demonstrate</p> <p>Show first aid box</p> <p>Hands-on practice</p> <p>Video</p> <p>Demonstrations</p>	CO1

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-II CONSTRUCTION ACTIVITIES (CL Hrs-NIL, Marks-NIL)				
2	<p>TLO 2.1 Explain the basic activities to be undertaken for the construction of the given component of the civil structure.</p> <p>TLO 2.2 Lay the foundation layout on-site using relevant techniques.</p> <p>TLO 2.3 Explain the safety precautions to be undertaken at the given construction site.</p>	<p>2.1 Construction activities such as layout, excavation, brick masonry, concreting, plumbing, electrification, and Interdependency of various activities.</p> <p>2.2 Causes of Accidents, Safety Practices and Precaution.</p>	<p>Demonstrate the various construction activities.</p> <p>Hands-on practice</p> <p>Field Visit,</p> <p>Videos</p>	CO2
UNIT-III MASONRY & FINISHING WORKS(CL Hrs-NIL, Marks-NIL)				
3	<p>TLO 3.1 Carry out the given type of masonry work using relevant tools.</p> <p>TLO 3.2 Explain the relevant method for doing plaster of the required thickness.</p> <p>TLO 3.3 Explain the relevant method of doing pointing work for rubble masonry</p> <p>TLO 3.4 Explain the need for the formwork in construction.</p> <p>TLO 3.5 Construct the false ceiling using relevant tools in the given situation.</p> <p>TLO 3.6 Fix the aluminium partition using the relevant specified material.</p> <p>TLO 3.7 Justify the need for plastering in construction.</p> <p>TLO 3.8 Undertake the flooring operation using the given type of flooring material.</p> <p>TLO 3.9 Explain the procedure for Painting a level surface of the given wall.</p> <p>TLO 3.10 Explain the relevant steps involved in Painting steel frames/wooden structures using a given type of paint.</p>	<p>3.1 Brick and stone Masonry work, Types of bonds and joints (vertical and horizontal)</p> <p>3.2 String (Line dori), plumb bob, right angle and water level tube.</p> <p>3.3 Plastering (Internal & External) work.</p> <p>3.4 Pointingwork</p> <p>3.5 Types of Formwork with Safety Measures.</p> <p>3.6 False ceiling, Plaster of Paris (POP) work.</p> <p>3.7 Aluminum glass works, cladding.</p> <p>3.8 Different Types of Flooring and its application</p> <p>3.9 Dado with its importance</p> <p>3.10 Whitewash and painting: - Tools required, brush, roller and spray-painting preparation of surface for timber and steel members for painting</p>	<p>Demonstrate Hands-on practice</p> <p>Tool handling.</p> <p>Simulation</p> <p>Videos.</p> <p>Field visit</p>	CO3

Sr. No	Theory Learning Outcomes (TLO's) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant Cos
CENTRAL WORKSHOP				
UNIT- IV PLUMBING FIXTURES(CL Hrs-NIL, Marks-NIL)				
4	<p>TLO 4.1 Undertake the plumbing operation for the given situation.</p> <p>TLO 4.2 Select the relevant tools to perform the given plumbing work.</p> <p>TLO 4.3 Use the concerned tools to lay the pipeline of required specifications using relevant fittings</p> <p>TLO 4.4 Draw the flow chart describing the laying operations of the water supply pipeline from the overhead tank to the given flat/house.</p>	<p>4.1 Different types of pipes, Joints, and Taps. Fixtures and accessories used in plumbing.</p> <p>4.2 Components (pipes, valves bends.) used in water supply/sanitary/ sewerage lines.</p> <p>4.3 Pipe fittings- bends, elbows, tees, cross, coupler, socket, reducer, cap, plug, nipple and their Specifications</p> <p>4.4 Various Operations in plumbing shops- pipe bending machines their specifications and maintenance. Basic process cutting, threading etc.</p>	<p>Demonstrate Hands-on practice. Simulation Videos. Field visit.</p>	CO4
UNIT –V SHEET METAL(CL Hrs-NIL, Marks-NIL)				
5	<p>TLO 5.1 Identify the tools used in sheet metal work, available in the workshop.</p> <p>TLO 5.2 Perform the required operation on sheet metal using relevant tools in a given situation.</p> <p>TLO 5.3 Perform bending operations on the given piece of sheet metal</p> <p>TLO 5.4 Maintain the equipment and machinery used in sheet metal works.</p>	<p>51 Sheet metal hand tools snip, shears sheet gauge, straight edge, L square, scribe, divider, trammel, punches, pliers, stakes, groovers, limit set and their Specifications</p> <p>52 Operation of machinery in sheet metal shops- sheet cutting and bending machine their specifications and maintenance.</p> <p>53 Basic process- marking, bending, folding, edging, seaming, staking, riveting.</p>	<p>Demonstrate Hands-on practice. Simulation Videos.</p>	CO5
UNIT –VI CARPENTRY WORK(CL Hrs-NIL, Marks-NIL)				
6	<p>TLO 6.1 Select the relevant type of wood in the given situation</p> <p>TLO 6.2 Carry out the relevant operations on the given piece of wood using the carpentry tools.</p> <p>TLO 6.3 Maintain carpentry tools in good condition.</p> <p>TLO 6.4 Use the relevant type of material for preparing the furniture of the given specification.</p>	<p>6.1 Types of engineered woods such as plywood, blockboard, hardboard, laminated boards, Veneer, and fibre Boards and their applications.</p> <p>6.2 Woodworking hand tools carpentry vice, marking and measuring tools, saws, claw hammer, mallet, chisels, planes, squares, and their specifications</p> <p>6.3 Operation of woodworking machinery - Wood turning lathe, circular saw, their specifications</p>	<p>Demonstrate Hands-on practice. Simulation Videos</p>	CO6

Sr. No	Theory Learning Outcomes (TLO's) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant Cos
		and maintenance. 64 Basic process- marking, sawing, planning, chiselling, turning, grooving, boring. 65 Components of woodwork- different types of Hinges, tower bolts, brackets etc.		

V. 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	LLO 1.1 Safety Practices & Precautions	* Operate the fire extinguisher available in the laboratory (Any two types)	2	CO1
2	LLO 2.1 Safety Practices & Precautions	Perform mock drill for extinguishing fire. (Group of 10 students preferably)	4	CO1
3	LLO 3.1 Construction activities	* Prepare the report of the site visit of a construction project with reference to substructure construction activities along with the equipment used.	4	CO2
4	LLO 4.1 Construction activities	* Perform the lineout activity on the site for the given type of foundation work.	4	CO2
5	LLO 5.1 Construction activities	* Prepare a report on the observation carried out on the site regarding the safety precautions followed during construction activities.	4	CO2
6	LLO 6.1 Study the different Agricultural Equipment's and their applications.	Prepare a report on different equipment involved in agricultural activities	2	CO6
7	LLO 7.1 Construction activities	Prepare a report on vernacular construction techniques used in old constructions.	2	CO2
8	LLO 8.1 Construction activities	* Prepare the schematic diagram of the given structure by measuring its dimensions using measuring tape	2	CO2
9	LLO 9.1 Construction activities	Survey the construction material through the internet with reference to their properties, cost and utilities.	2	CO2
10	LLO 10.1 Masonry & Finishing work	* Prepare the report of the site visit of a construction project with reference to superstructure construction activities along with the equipment used.	6	CO3

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
11	LLO 11.1 Masonry & Finishing work	* Construct a corner brick wall using the relevant type of bond by ensuring the wall is in a straight line, plumb and at a right angle. (Group of 10 students).	6	CO3
12	LLO 12.1 Masonry & Finishing work	* Transfer the marked level to the required location by using the water tube level for a given construction activity.	4	CO3
13	LLO 13.1 Masonry & Finishing work	* Conduct various field tests on the given sample of cement to check its quality.	4	CO3
14	LLO 14.1 Masonry & Finishing work	* Conduct various field tests on the given sample of brick to check its quality.	2	CO3
15	LLO 15.1 Plumbing Fixtures	* Prepare the pipeline of the required length using the given type of fittings.	2	CO4
16	LLO 16.1 Plumbing Fixtures	* Connect the two pipes of given diameters in the form of T- a joint by using the relevant pipe fitting.	4	CO4
17	LLO 17.1 Sheet Metal	* Prepare the given shape of the sheet metal utility job (tray, dustbin, letterbox, fire bucket etc.) using the following operations 1. Cutting And Bending 2. Edging 3. End Curling 4. Lancing 5. Welding 6. Riveting	4	CO5
18	LLO 18.1 Carpentry Work	Perform the sawing operation on the given sample of wood to convert the rough surface to a smooth and levelled surface.	4	CO6
19	LLO 19.1 Carpentry Work	Prepare any one joint from a) Tongue and groove joint b) lap joint c) Tenon and mortise joint required for the truss.	2	CO6
20	LLO 20.1 Carpentry Work	* Compile the information in a report format, regarding the latest construction equipment used in a construction project through internet surfing.	2	CO6
21	LLO 21.1 Carpentry Work	Prepare the article job (like name plate, hanger, stool, teepoy, chourang etc.)	4	CO6
22	LLO 22.1 Carpentry Work	Maintenance of wooden equipments used in Civil Engineering.	4	CO6

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
23	LLO 23.1 Carpentry Work	Prepare a report on various ancient tools/modern tools.(Any Five each)	2	CO2 CO3 CO4 CO5 CO6
24	LLO 24.1 Study and collect information about various heritage structures	* Prepare a report on the site visit of a Heritage structure/ Ancient structure available in the immediate vicinity (Any Two)	4	CO2 CO3 CO4 CO5 CO6

Note: A suggestive list of LLOs is given in the above table. A judicious mix of a minimum of 20 LLOs needs to be performed out of 24. Practical having S.R.NO. 1 to 14 and 24 are to be conducted by civil engineering Department and remaining by Central Workshop. The LLOs which are marked as ‘*’ at the start of practicals are compulsory so that the student reaches the ‘Precision Level’ of Dave’s ‘Psychomotor Domain Taxonomy’ as generally required by the industry.

VI. SUGGESTED MICROPROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING /SKILLS DEVELOPMENT(SELF-LEARNING)

Assignment

- Undertake a market survey of local dealers for procurement of civil engineering materials, plumbing materials and finishing items.
- Organize a visit to Construction sites of different types such as simple residential buildings, malls, and multistoried buildings. Observe the course/topic-based practices in the field.
- Course library internet-based mini-projects.
- Develop PowerPoint presentations or animation for activities seen during field visits.
- Concerned faculty members may add the assignments.

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Fire buckets of standard size.	1
2	Fire extinguisher (Type A,B,C and ABC)	2
3	Measuring Tape (15meter ,30meter)	8
4	Ordinary Portland Cement (43,53 grade)	13
5	Raw materials such as bricks of standard size 230 mm x 115 mm x 75 mm,	11,14

Sr. No	Equipment Name with Broad Specifications	Relevant LLO Number
6	Trowels (Brick, Buttering, Pointing), triangular, ranging in size up to about 11 inches (279.40 mm) long and from 101.6 mm to 203.2 mm wide i.e. (4 to 8 inches wide).	11,14
7	Portable Hammer, Spade, Pans (ghamela), Thread, lime	11,14
8	Square, Mason's level, and straightedge 28.57 mm to 38. 10 mm and the middle 4 portions of the top edge from 152.40 mm to 254 mm wide	11
9	Levels and Mason's line, brushes	11
10	String Level/Water tube, Plumb bob. Right Angle	12
11	The mason's level to establish "plumb" and "level" lines.	12
12	Plumbing materials such as pipes and accessories for different sizes and materials. Pipe wrench	15,16,17
13	Components of woodwork- different types of Hinges, tower bolts, brackets etc.	19,20
14	Sheet metal hand tools- snip, shears sheet gauge, straight edge, L square, scriber, divider, trammel, punches, pliers, stakes, groovers, limit set	17

VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

NOT APPLICABLE

IX. ASSESSMENT METHODOLOGIES / TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
• Termwork	• Practical

X. SUGGESTED COS- POSMATRIXFORM

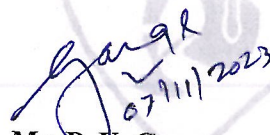

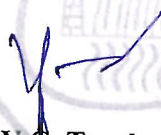

NOT APPLICABLE

XI. SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No	Author	Title	Publisher
1	PWD	PWD- Standard Data Book for Building Work	PWD, Government of Maharashtra, Mumbai.
2	CPWD	CPWD Specifications (Vol.-1 and IT)	CPWD, Govt. of India, New Delhi.
3	PWD	District Schedule of Rates, (DSR)	PWD, Government of Maharashtra, Mumbai.
4	Mantri Sandeep	A To Z Of Practical Building Construction & its Management	Satya Prakashan, New Delhi: 2015; ISBN 9788176842051

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	http://www.asnu.com.au	Experts in residential house painting, carpentry repairs and renovations.
2.	www.mahapwd.com/	Official Portal for Public Works Department for Maharashtra State
3.	cpwd.gov.in/	Official Portal for Public Works Department for Government of India
4.	https://wrd.maharashtra.gov.in/	Official Portal for Water Resource Department for Government of Maharashtra
5.	https://theconstructor.org/building/types-bonds-brick-masonry-flemish-english-wall/11616/	Different types of brick bonds
6.	https://dailycivil.com/types-of-joints-in-plumbing/	Different types of plumbing materials and joints

<p>Name & Signature:</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  Mr. P.U. Garge Lecturer in Mechanical Engineering & I/C Workshop Superintendent </div> <div style="text-align: center;">  Smt. Sindhu R. Panapalli Lecturer in Civil Engineering </div> </div> <p style="text-align: center;">(Course Experts)</p>	
<p>Name & Signature:</p> <div style="text-align: center;">  Shri.V.G. Tambe (Programme Head) </div>	<p>Name & Signature:</p> <div style="text-align: center;">  Shri. S.B. Kulkarni (CDC In-charge) </div>

GOVERNMENT POLYTECHNIC, PUNE
'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/EE/ET/ME/MT/CM/IT/DDGM
PROGRAMME CODE	01/02/03/04/05/06/07/08
COURSE TITLE	FUNDAMENTALS OF ICT
COURSE CODE	CM21201
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
			Actual Contact Hrs./Week			SLH	NLH			Theory			Based on LL & TSL				Based on SL			
			CL	TL	LL					FA-TH	SA-TH	Total	Practical		SLA					
						FA-PR	SA-PR						SLA							
Max	Max	Max	Min	Max	Min	Max	Min	Max	Min											
CM21201	FUNDAMENTALS OF ICT	SEC	1	-	2	1	4	2	--	--	--	--	--	25	10	25@	10	25	10	75

Total IKS Hrs for Term: 0 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, IKS – Indian Knowledge System, SLA- Self Learning Assessment

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

Note:

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

- If a candidate is not securing minimum passing marks in FA-PR (Formative Assessment - Practical) of any course, then the candidate shall be declared as '**Detained**' in that semester.
- If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as '**fail**' and will have to repeat and resubmit SLA work.
- Notional learning hours** for the semester are (CL + LL + TL + SL) hrs. * 15 Weeks
- 1 credit** is equivalent to **30 Notional hours**.
- * Self-learning hours shall not be reflected in the Timetable.
- * Self-learning includes micro-projects/assignments/other activities.

II. RATIONALE:

In any typical business set up to carry out routine tasks related to creating business documents, performing data analysis and its graphical representations and making electronic slide show presentations, the student needs to learn various software such as office automation tools like word processing applications, spreadsheets and presentation tools. They also need to use these tools for making their project reports and presentations. The objective of this course is to develop the basic competency in students for using these office automation tools to accomplish the job. This course also presents an overview of emerging technologies so that students of different disciplines can appraise the applications of these technologies in their respective domains.

III. COURSE-LEVEL LEARNING OUTCOMES (CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

- CO1: Use a computer system and its peripherals for a given purpose.
 CO2: Prepare Business documents using a Word Processing Tool.
 CO3: Analyze Data and represent it graphically using Spreadsheet.
 CO4: Prepare professional Slide Show presentations.
 CO5: Explain the concept and application of emerging technology.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-I INTRODUCTION TO COMPUTER SYSTEM (CL Hrs-2, Marks-NIL)				
1.	<p>TLO 1.1 Explain the functions of components in the block diagram of the computer system.</p> <p>TLO 1.2 Classify the given type of software.</p> <p>TLO 1.3 Explain the characteristics of the given type of network.</p> <p>TLO 1.4 Describe the application of the given type of network connecting device.</p> <p>TLO 1.5 Describe the procedure to manage a file /folder in the given way.</p>	<p>1.1 Basics of Computer System: Overview of Hardware and Software: block diagram of Computer System, Input/output unit CPU, Control Unit, Arithmetic logic Unit (ALU), Memory Unit.</p> <p>1.2 Internal components: processor, motherboards, random access memory (RAM), read-only memory (ROM), video cards, sound cards and internal hard disk drives).</p> <p>1.3 External Devices: Types of input/output devices, types of monitors, keyboards, mouse, and printers: Dot matrix, Inkjet and LaserJet, plotter and scanner, external storage devices CD/DVD, Hard disk and pen drive.</p> <p>1.4 Application Software: word processing, spreadsheet, database management systems, control software, measuring software, photo-editing software, video-editing software, graphics manipulation software System Software compilers, linkers, and device drivers.</p> <p>1.5 Network environments: network interface cards, hubs, switches, routers and modems, the concept of LAN, MAN, WAN, WLAN, Wi-Fi and Bluetooth.</p> <p>1.6 Working with Operating Systems: Creating and managing files and folders, Copying a file, renaming and deleting files and folders, Searching files and folders, application installation, and creating shortcuts of applications on the desktop.</p>	Hands-on Demonstration Presentations	CO1

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-II WORD PROCESSING (CL Hrs-3, Marks-NIL)				
2	<p>TLO 2.1 Write the steps to create the given text document.</p> <p>TLO 2.2 Explain the given feature for document editing.</p> <p>TLO 2.3 Explain the given page setup features of a document.</p> <p>TLO 2.4 Write the given table formatting feature.</p> <p>TLO 2.5 Write the steps to set the given type of document layout</p>	<p>2.1 Word Processing: Overview of Word processor Basics of Font type, size, colour, Effects like Bold, italic, underline, Subscript and superscript, Case changing options, Previewing a document, Saving a document, Closing a document and exiting the application.</p> <p>2.2 Editing a Document: Navigate through a document, Scroll through text, Insert and delete text, Select text, Undo and redo commands, Use drag and drop to move text, Copy, cut and paste, Use the clipboard, Clear formatting, Format and align text, Formatting.</p> <p>2.3 Changing the Layout of a Document: Adjust page margins, Change page orientation, Create headers and footers, Set and change indentations, and Insert and clear tabs.</p> <p>2.4 Inserting Elements to Word Documents: Insert and delete a page break, Insert page numbers, Insert the date and time, Insert special characters (symbols), Insert a picture from a file, and Resize and reposition a picture.</p> <p>2.5 Working with Tables: Insert a table, Convert a table to text, Navigate and select text in a table, Resize table cells, Align text in a table, Format a table, Insert and delete columns and rows, Borders and shading, repeat table headings on subsequent page.</p> <p>2.6 Working with Columned Layouts and Section Breaks: Columns, Section breaks, Creating columns, Newsletter style columns, changing part of a document layout or formatting, Remove section breaks, Adding columns to the remainder of a document, Column widths.</p>	Hands-on Demonstration Presentations	CO2
UNIT-III SPREADSHEETS (CL Hrs-03, Marks-NIL)				
3	<p>TLO 3.1 Write the steps to create the given spreadsheet.</p> <p>TLO 3.2 Explain the given formatting feature of a worksheet.</p> <p>TLO 3.3 Write steps to insert formulas and functions in the given worksheet.</p>	<p>3.1 Working with Spreadsheets: Overview of workbook and worksheet, Create Worksheet Entering sample data, Save, Copy Worksheet, Delete Worksheet, Close and open Workbook.</p> <p>3.2 Editing Worksheet: Insert and select data, adjust row height and column width, delete, move data, insert rows and columns, Copy and Paste, Find and Replace, Spell Check, Zoom In-Out, Special Symbols, Insert Comments, Add Text Box, Undo Changes, - Freeze</p>	Hands-on Demonstration Presentations	CO3

	<p>TLO 3.4 Write steps to create charts for the given data set.</p> <p>TLO 3.5 Explain steps to perform data filter, sort and validation operations on the given data set.</p> <p>TLO 3.6 Write steps to set up and print a spreadsheet.</p>	<p>3.3 Formatting Cells and sheet: Setting Cell Type, Setting Fonts, Text options, rotating cells, Setting Colors, Text Alignments, Merge and Wrap, applying Borders and Shades, Sheet Options, Adjust Margins, Page Orientation, Header and Footer, Insert Page Breaks.</p> <p>3.4 Working with Formula: Creating Formulas, Copying Formulas, Common spreadsheet Functions such as sum, average, min, max, date, In, And, or, mathematical functions such as sqrt, and power, applying conditions using IF.</p> <p>3.5 Working with Charts: Introduction to charts, an overview of different types of charts, Bar, Pie, and Line charts, creating and editing charts. Use chart options: chart title, axis title, legend, data labels, Axes, grid lines, and moving chart in a separate sheet.</p> <p>3.6 Advanced Operations: Conditional Formatting, Data Filtering, Data Sorting, Using Ranges, Data Validation, Adding Graphics, Printing Worksheets, print area, margins, header, footer and other page setup options.</p>		
UNIT- IV PRESENTATION TOOL (CL Hrs-04, Marks-NIL)				
4	<p>TLO 4.1: Write the steps to create the given slide presentation.</p> <p>TLO 4.2: Write the steps to insert multiple media in the given presentation.</p> <p>TLO 4.3: Explain the method of including animation, and transition effects in a slide show.</p> <p>TLO 4.4: Write steps to apply table features in the given presentation</p> <p>TLO 4.5: Write steps to manage charts in the given presentation.</p>	<p>4.1 Creating a Presentation: Outline an effective presentation, identify the elements of the User Interface, Create New Presentation Files, Create a Basic Presentation, Work with textboxes, Apply Character Formats, and Format Paragraphs.</p> <p>4.2 Inserting Media Elements: Adding and Modifying Graphical Objects to a Presentation - Insert Images into a Presentation, insert audio clips, video/animation, Add Shapes, Add Visual Styles to Text in a Presentation, Edit Graphical Objects on a Slide, Format.</p> <p>4.3 Working with Tables: Insert a Table in a Slide, Format Tables, and Import Tables from Other Office Applications.</p> <p>4.4 Working with Charts: Insert Charts in a Slide, Modify a Chart, and Import Charts from Other Office Applications.</p>	Hands-on Demonstration Presentations	CO4

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT –V BASICS OF INTERNET AND EMERGING TECHNOLOGIES (CL Hrs-04, Marks-NIL)				
5	<p>TLO 5.1 Explain the use of the given setting option in browsers.</p> <p>TLO 5.2 Explain the given option used for effective searching in search engine</p> <p>TLO 5.3 Explain the features of the given web service.</p> <p>TLO 5.4 Explain concepts and applications of emerging technologies</p> <p>TLO 5.5 Use various elementary cloud-based tools</p>	<p>5.1 World Wide Web: Introduction, Internet, Intranet, Cloud, Web Sites, web pages, URL, web servers, basic settings of web browsers- history, extension, default page, default search engine, creating and retrieving bookmarks, use search engines effectively.</p> <p>5.2 Web Services: e-Mail, Chat, Video Conferencing, e-learning, e-shopping, e-Reservation, e-Groups, Social Networking.</p> <p>5.3 Emerging Technologies: IoT, AI and ML, Drone Technologies, 3D Printing.</p> <p>5.4 Tools: Docs, Drive, forms, quiz, Translate and other Apps.</p>	Hands-on Demonstration Presentations	CO5

V. 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	<p>LLO 1.1 Identify various Input/output devices, connections and peripherals of the computer system.</p> <p>LLO 1.2 Work with Computer systems, Input/output devices, and peripherals to manage files and folders for data storage.</p>	<p>a) Work with Computer Systems, Input/output devices, and peripherals.</p> <p>b) Work with files and folders</p>	2	CO1
2	<p>LLO 2.1 Create and manage Word document.</p> <p>LLO 2.2 Apply formatting features on text at line, paragraph and page level.</p>	<p>Work with document files:</p> <p>a) Create, edit and save documents in Word Processing.</p> <p>b) Text, lines and paragraph-level formatting</p>	2	CO2
3	LLO 3.1 Insert and edit images, and shapes in a document file.	Work with Images and Shapes in Word Processing.	2	CO2
4	LLO 4.1 Insert table and apply various table formatting features on it.	Work with tables in Word Processing.	2	CO2
5	<p>LLO 5.1 Apply page layout features in word processing.</p> <p>LLO 5.2 Print a document by applying various print options</p> <p>LLO 5.3 Use mail merge in word processing</p>	<p>Working with layout and printing a) Document page layout, Themes, and printing.</p> <p>b) Use of mail merge with options.</p>	2	CO2

VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

Self-Learning

Following are some suggestive self-learning topics:

- 1) Use ChatGPT/any other AI tool to explore information.
- 2) Use Calendar to Schedule and edit activities.
- 3) Use the Translate app to translate the given content from one language to another.
- 4) Use a cloud-based storage drive to store and share your files.

Micro project

The micro project has to be industry application-based, internet-based, workshop-based, laboratory-based or field-based as suggested by the Teacher.

- 1) Perform a survey on various inputs and output devices available in the market and make its report.
- 2) Prepare a table, Prepare Notes on Technical Topics, Reports, and Bio data with a cover letter (The subject teacher shall assign a document to be prepared by each student)
- 3) Prepare slides with all Presentation features such as classroom presentation, presentation about the department, and presentation of Technical Topics. (The subject teacher shall assign a presentation to be prepared by each student).
- 4) Student Mark sheet, Prepare Pay bills, tax statements, and student assessment records using a spreadsheet. (The teacher shall assign a spreadsheet to be prepared by each student).
- 5) Carry out Surveys on different web browsers.
- 6) Generate resumes for different job profiles, and survey reports of any industry using ChatGPT/any other AI tool.

Assignment

Prepare a journal of practicals performed in the laboratory.

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	a) Computer System with all necessary Peripherals and Internet connectivity. b) Any Office Software c) Any Browser (Any General Purpose Computer available in the Institute)	ALL

VIII.SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr. No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction to Computer System	CO1	2	--	--	--	--
2	II	Word Processing	CO2	3	--	--	--	--
3	III	Spreadsheets	CO3	3	--	--	--	--
4	IV	Presentation Tool	CO4	4	--	--	--	--
5	V	Basics of Internet and Emerging Technologies	CO5	3	--	--	--	--
Grand Total				15	--	--	--	--

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
Lab performance, Assignment, Self-learning and Seminar/Presentation	Lab. Performance, viva voce

X. SUGGESTED COS- POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes(POs)							Programme Specific Outcomes *(PSOs)		
	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	PSO-3
CO1	1	-	-	-	-	-	1	2	-	-
CO2	-	-	-	3	-	-	1	-	-	1
CO3	-	2	1	3	-	-	1	-	3	1
CO4	-	-	-	3	-	-	1	-	-	1
CO5	1	-	-	3	-	-	3	2	-	1

Legends:- High:03, Medium:02, Low:01, No Mapping: -
*PSOs are to be formulated at the institute level

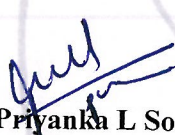
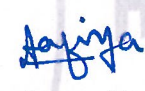


XI. SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No	Author	Title	Publisher
1	Goel, Anita	Computer Fundamentals	Pearson Education, New Delhi, 2014, ISBN-13: 978-8131733097
2	Miller, Michael	Computer Basics Absolute Beginner's Guide, Windows 10	QUE Publishing; 8th edition August 2015, ISBN: 978-0789754516
3	Alvaro, Felix	Linux: Easy Linux for Beginners	CreateSpace Independent Publishing Platform- 2016, ISBN-13: 978-1533683731
4	Johnson, Steve	Microsoft Office 2010: On Demand	Pearson Education, New Delhi India, 2010. ISBN:9788131770641
Sr.No	Author	Title	Publisher
5	Schwartz, Steve	Microsoft Office 2010 for Windows: Visual Quick Start	Pearson Education, New Delhi India, 2012, ISBN: 9788131766613
6	Leete, Gurdy, Finkelstein Ellen, Mary Leete	OpenOffice.org for Dummies	Wiley Publishing, New Delhi, 2003 ISBN : 978-0764542220

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	https://www.microsoft.com/en-in/learning/office-training.aspx	Office
2.	http://www.tutorialsforopenoffice.org/	Open Office

3.	https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d/Special_Edition_Using_StarOffice_6_0.pdf	Open Office
4.	https://ashishmodi.weebly.com/uploads/1/8/9/7/18970467/computer_fundamental.pdf	Computer Fundamental
5.	http://www.tutorialsforopenoffice.org/	Open Office
6.	https://www.tutorialspoint.com/computer_fundamentals/index.htm	Computer Fundamental
7.	https://www.tutorialspoint.com/word/	Word Processing
8.	https://www.javatpoint.com/ms-word-tutorial	Word Processing
9.	https://support.microsoft.com/en-au/office/word-for-windows-training-7bcd85e6-2c3d-4c3c-a2a5-5ed8847	Word Processing
10.	https://www.javatpoint.com/excel-tutorial	Spreadsheet
11.	https://support.microsoft.com/en-au/office/excel-video-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb	Spreadsheet
12.	https://www.javatpoint.com/powerpoint-tutorial	Powerpoint Presentation
13.	https://support.microsoft.com/en-au/office/powerpoint-for-windows-training-40e8c930-cb0b-40d8-82c4-b	Powerpoint Presentation
14.	https://www.geeksforgeeks.org/ms-dos-operating-system/	Operating System

Name & Signature:	
 Smt. Priyanka L Sonwane Lecturer in Information Technology (Course Experts)	 Smt. Aafiya A Shaikh Lecturer in Information Technology Computer Engineering
Name & Signature:	Name & Signature:
 Shri. V.G. Tambe (Programme Head)	 Shri. S. B. Kulkarni (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/EE/ET/ME/MT/CM/IT/DDGM
PROGRAMME CODE	01/02/03/04/05/06/07/08
COURSE TITLE	YOGA AND MEDITATION
COURSE CODE	HU21201
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme						Credits	Paper Duration	Assessment Scheme										Total Marks
			Actual Contact Hrs./Week			SLH	NLH	Theory			Based on LL & TSL				Based on SL						
			CL	TL	LL			FA-TH			SA-TH	Total	Practical		SLA						
			Max	Max	Max/Min	Max/Min	Max/Min	Max/Min			Max/Min	Max/Min	Max/Min	Max/Min							
HU21201	YOGA AND MEDITATION	VEC	-	-	1	1	2	1	-	-	-	-	-	-	25	10	-	-	25	10	50

Total IKS Hrs for Term: 1Hr

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

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

Note:

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in FA-PR (Formative Assessment - Practical) of any course, then the candidate shall be declared as 'Detained' in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as 'fail' and will have to repeat and resubmit SLA work.
3. Notional learning hours for the semester are (CL + LL + TL + SL) hrs. * 15 Weeks
4. 1 credit is equivalent to 30 Notional hours.
5. * Self-learning hours shall not be reflected in the Timetable.
- 6.* Self-learning includes micro-projects/assignments/other activities.

II. RATIONALE:

Diploma Graduate needs a sound body and mind to face the challenging situations in a career as an employee or as an entrepreneur. Yoga and Meditation bring about the holistic development of an individual and equip him with the necessary balance to handle the challenges. The age of polytechnic students is appropriate to get introduced to yoga practice as this will help them in their studies as well as their professional lives. Moreover, Yoga inculcates discipline in all walks of the life of students. Pranayama practice regulates the breathing practices of the student to improve stamina and resilience.

Meditation empowers a student to focus and keep calm to get peace of mind. World Health Organization (WHO) has also emphasized the role of yoga and meditation as stress prevention measures. National Education Policy 2020 highlights the importance of yoga and meditation amongst students of all ages. Therefore, this course for Diploma students is designed for the overall well-being of the student and aims to empower students to adopt and practice "Yoga" in daily life.

III. COURSE-LEVEL LEARNING OUTCOMES (CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

CO1 - Practice basic Yoga and Pranayama in daily life to maintain physical and mental fitness.

CO2 - Practice meditation regularly to improve concentration and better handling of stress and anxiety.

CO3 - Follow a healthy diet and hygienic practices for maintaining good health.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

NOT APPLICABLE

V. 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	LLO 1.1 Practice warming up for Yoga.	Introduction:- Presentations on Introduction to Yoga and its History. Lab Exp: 1. Perform warming-up exercises to prepare the body from head to toe for Yoga.	5	CO1
2	LLO 2.1 Practice Surya Namaskar	Lab Exp: 2. Perform all the postures of Surya Namaskar one by one at a very slow pace, after warm-up. Lab Exp 3. Perform multiple Surya Namaskar (Starting with three and gradually increasing it to twelve) in one go. Experiments 2 to 4 must be followed by Shavasana for self-relaxation.	7	CO1, CO2
3	LLO 3.1 Practice basic Asanas	Lab Exp: 4 Perform Sarvangasna, Halasana, Kandharasana (setubandhasana) Lab Exp: 5 Perform Bhujangasana, Naukasana, Mandukasana Lab Exp: 6 Perform Paschimottasana, Baddhakonasana, Bharadwajasana. Lab Exp: 7 Perform Veera Bhadrasana, Vrukshasana, Trikonasana. Follow-up experiments 5 to 7 with Shavasana for self-relaxation	8	CO2
4	LLO 4.1 Practice basic Pranayama	Lab Exp: 8 Perform Bhastrika, Anulom Vilom Pranayam Kriya Lab Exp: 9 Practice Kapalbhati Pranayam Kriya Lab Exp: 10 Practice Bhramary Pranayam.	5	CO3

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
5	LLO 5.1 Practice Meditation	Lab Exp: 11 Perform sitting in Dhyana Mudra and meditating. Start with five minutes and slowly increasing to higher durations. The trainer will explain the benefits of Meditation before practice	5	CO3

Note :

1. The start and end of each session can be with appropriate Yoga prayers and chanting of Omkar.
2. Trainers can add similar asanas in practical sessions.
3. Students are to be instructed to practice the experiment performed at least twice a week as part of self learning practices.
4. A live demonstration by the trainer needs to be carried out during practical hours. Yogic Videos can be used as well.

VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

Micro project

- Maintain a diary indicating date-wise practice done by the student with a photograph of self in yogic posture.

Assignment

- Prepare a Diet and nutrition chart for Self.

Learning

- Practice at least thrice a week.
- Read books on different methods to maintain health, and wellness and to enhance mood.
- Watch videos on Yoga Practices.

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Yoga and Meditation kits : Yoga Mats, Yoga Rollers, Yoga Blocks, Aero Yoga Clothing Blankets, Cloth Straps, Bolsters Wheels	ALL

VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

NOT APPLICABLE

IX.ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
Lab performance, Self-learning and Terms work	Actual Practical Performance

X. SUGGESTED COS- POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes(POs)							Programme Specific Outcomes *(PSOs)		
	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	PSO-3
CO1	-	-	-	-	3	-	-			
CO2	-	-	-	-	3	-	-			
CO3	-	-	-	-	3	-	-			
CO4	-	-	-	-	3	-	-			
CO5	-	-	-	-	3	-	-			

Legends:- High:03, Medium:02, Low:01, No Mapping: -
*PSOs are to be formulated at the institute level

XI.SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No.	Author	Title	Publisher
1	Swami Vivekananda	Patanjalis Yoga Sutras	Fingerprint Publishing (2019) ISBN-10 9389567351
2	Luisa Ray (Author), Angus Sutherland (Illustrator)	Yoga for Every Body: A beginner's guide to the practice of yoga postures, breathing exercises and meditation.	Vital Life Books (2022) ISBN-13: 9781739737030, ISBN-10: 1739737032
3	Swami Saradananda	Mudras for Modern Life: Boost your health, re-energize your life, enhance your yoga and deepen your meditation	Watkins Publishing ISBN: 9781780289984, Edition: 2018
4	Martha Davis, Elizabeth Robbins, Matthew McKay, Eshelman MSW	The Relaxation and Stress Reduction Workbook	A New Harbinger Self-Help Workbook (2019)
5	SWANSON, ANN	Science of Yoga: Understand the Anatomy and Physiology to Perfect Your Practice	Penguin Random House, ISBN 13 9780241341230

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	https://onlinecourses.swayam2.ac.in/aic19_ed28/preview	Introduction to Yoga and Applications of Yoga - Course (swayam2.ac.in)
2.	https://onlinecourses.swayam2.ac.in/aic23_review	Yoga for Creativity
3.	https://onlinecourses.swayam2.ac.in/aic23_ge05/preview	Yoga for concentration
4.	https://onlinecourses.swayam2.ac.in/aic23_ge06/preview	Yoga for Memory Development
5.	https://onlinecourses.nptel.ac.in/noc21_hs29/preview	Psychology of Stress, Health and Well-being
6.	https://onlinecourses.swayam2.ac.in/nce19_sc04/preview	Food Nutrition for Healthy Living


Name & Signature:

(Course Experts)

Name & Signature:

Name & Signature:


Shri. V.G. Tambe
 (Programme Head)


Shri. S.B. Kulkarni
 (CDC In-charge)