

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	FA-PR		SA-PR		SLA				
													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.	Identify Learning Outcomes (ILO's) aligned to CO's	Learning content mapped with ILO's	Suggested Learning Pedagogies	Relevant COs
UNIT-II TRIGONOMETRY (CL Hrs-16, Marks-14)				
2	<p>ILO 2.1: Apply the concept of Compound angle, allied angle, and multiple angles to solve the given simple engineering problem(s).</p> <p>ILO 2.2: Apply the concept of Sub-multiple angle to solve the given simple engineering-related problems.</p> <p>ILO 2.3: Apply the concept of factorization and de-factorization formulas to solve the given simple engineering problem(s).</p> <p>ILO 2.4: Investigate given simple problems by utilizing inverse trigonometric ratios.</p> <p>ILO 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 Sulbasutras.</p>	<p>Improved Lecture Tutorial Assignment Demonstration Simulation</p>	CO2
UNIT-III STRAIGHT LINE (CL Hrs-06, Marks-08)				
3	<p>ILO 3.1 Calculate the angle between given two straight lines.</p> <p>ILO 3.2 Formulate equation of straight lines related to given engineering problems.</p> <p>ILO 3.3 Identify the perpendicular distance from the given point to the line.</p> <p>ILO 3.4 Calculate the perpendicular distance between the given two parallel lines.</p> <p>ILO 3.5 Use geometry given in Sulbasutras to solve the given problems.</p>	<p>3.1 Straight line and slope of a straight line:</p> <ol style="list-style-type: none"> The angle between two lines Condition of parallel and perpendicular lines <p>3.2 Various forms of straight lines:</p> <ol style="list-style-type: none"> General form Slope-point form Slope-intercept form Two-point form 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 Sulbasutras in Indian Knowledge System:</p> <ol style="list-style-type: none"> Construction of square Carling the square 	<p>Improved Lecture Tutorial Assignment Demonstration Simulation</p>	CO3

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

COURSE TITLE: BASIC MATHEMATICS

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 any 15 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

Assignment

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

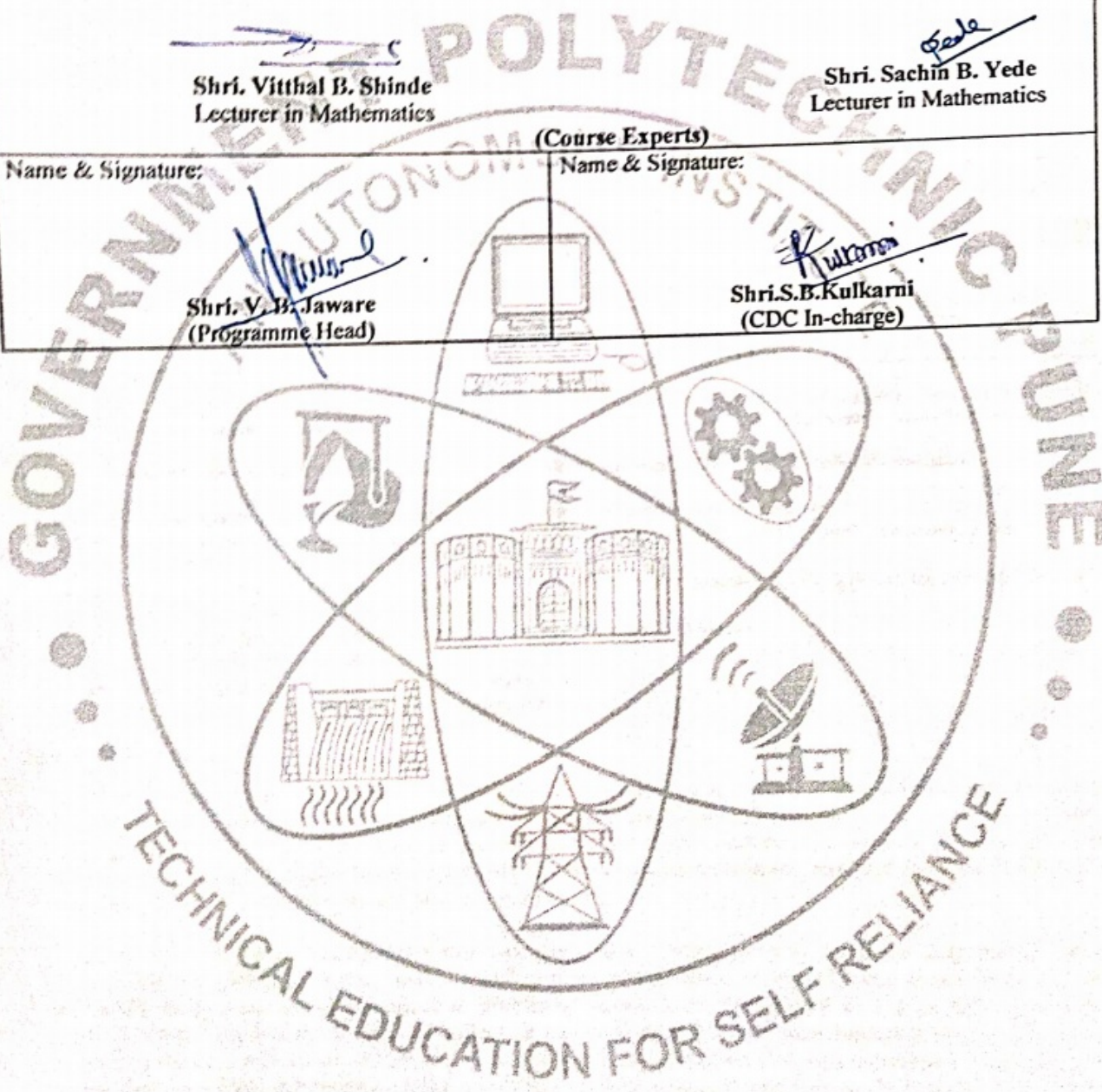
Sr. No	Author	Title	Publisher
1	Grewal B.S.	Higher Engineering Mathematics	Khanna publication New Delhi, 2013 ISBN: 8174091955
2	Dutta D.	A textbook of Engineering Mathematics	New Age publication New Delhi, 2006 ISBN: 978-81-224-1689-3
3	Kreyszig, Ervin	Advance Engineering Mathematics	Wiley publication 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. Sargent	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. B. Jaware (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 MECHANICS
COURSE CODE	AM21201
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			SLI	NLI			Theory	Based on I.L. & TNL				Based on SL					
			CL	TL	LL						FA-PR	SA-PR	SLA	Max	Min					
			Max	Max	Max/Min	Max/Min	Max/Min			Max/Min										
AM21201	ENGINEERING MECHANICS	DSC	3	-	2	1	6	3	3	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, SLI-Self Learning Hours, NLI-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-TII 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:

To find solutions to various practical problems, it is essential to study and get acquainted with the various aspects in Statics and Dynamics. Thus, this course gives the scope to understand fundamental concepts of laws of mechanics and their applications to different engineering problems. The fundamental concepts to be studied in this course are required for study of strength of materials, Mechanics of Structures and other course of Mechanical & Civil Engineering to be studied at higher level.

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 the force systems for given conditions by applying the basics of mechanics.
- CO2: Select the relevant simple lifting machine(s) for given purposes.
- CO3: Determine unknown force(s) of different engineering systems.
- CO4: Check the stability of various force systems.
- CO5: Apply the principles of friction in various conditions for useful purposes.
- CO6: Find the centroid and centre of gravity of various components in engineering systems.

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 MECHANICS AND FORCE SYSTEM (CL Hrs-04, Marks-06)				
1.	TLO 1.1 Explain concepts of the given terms. TLO 1.2 . Use the relevant units of various quantities in the given situations. TLO 1.3 Explain effects of a force on the given object. TLO 1.4 Identify the force system for the given situation.	1.1 Introduction 1.2 Derived unit, system of unit, Scalar and Vector quantity, 1.3 Definition of Applied Mechanics, Statics, Dynamics, Kinematics, and Kinetics. 1.4 Definition of Gravity, Mass, Weight, Inertia Newton's law of Gravitation and Newton's laws of motion.	Direct Instruction & Model Demonstration	CO1
UNIT-II SIMPLE MACHINES (CL Hrs-07, Marks-12)				
2	TLO2.1: Describe the components of the given lifting machine. TLO2.2: Differentiate the working principle of the given two types of simple lifting machines. TLO 2.3: Determine velocity ratio, efficiency and law of the given simple lifting machine. TLO 2.4: Calculate effort required and load lifted by the given simple lifting machine. TLO 2.5: Interpret the graphs after drawing them with the given data. TLO 2.6: Select the relevant simple lifting machine required for the given purpose with justification.	2.1 Definition of simple machine, mechanical advantage, velocity ratio, efficiency. Relation between them, friction in machines, effort lost in friction (Pf). 2.2 Reversibility, law of machine, max MA and max efficiency. Numerical on general simple lifting machines. 2.3 Study of machine - differential axle and wheel, simple screw jack, worm & worm wheel, single purchase crab only. Numerical to determine V.R., Pf, M.A., and efficiency	Direct Instruction & Model Demonstration	CO2
UNIT-III RESOLUTION AND COMPOSITION OF FORCES (CL Hrs-10, Marks-14)				
3	TLO 3.1 Resolve the given single force. TLO3.2 Calculate the resultant of the given force system analytically. TLO3.3 Determine graphically the resultant of the given force system. TLO 3.4 Find the resultant of the given force system using law of triangle and law of parallelogram.	3.1 Concept of force, unit force, graphical representation of force, Principle of transmissibility. 3.2 Systems of forces, coplanar, non-coplanar, concurrent non-concurrent, Parallel. 3.3 Resolution of a force, resolved parts, orthogonal and non-orthogonal. Components of a force. 3.4 Concept of composition & resultant of Forces. 3.5 Law of Parallelogram of forces, Triangle law of forces,	Direct Instruction & Model Demonstration	CO1, CO3

		<p>Polygon law of forces. Moment of a force, Varignon's theorem of moments, couple & characteristics of couple</p> <p>3.6 Composition of Coplanar forces-Concurrent, parallel (like and unlike) non concurrent forces by analytical methods.</p>		
UNIT- IV EQUILIBRIUM (CL Hrs-10, Marks-14)				
4	<p>TLO 4.1: Draw free body diagram for the given condition.</p> <p>TLO 4.2: Determine unknown force in the given situation using and Free body diagram, Analytical and graphical conditions of equilibrium.</p> <p>TLO 4.3: Identify the types of beams required for the given situation.</p> <p>TLO 4.4: Determine reactions in the given type of beam analytically and graphically.</p>	<p>4.1 Concepts of equilibrium, equilibrant, Relation between resultant & equilibrant. Analytical conditions.</p> <p>4.2 Equilibrium of coplanar concurrent forces, Lami's theorem, and its applications.</p> <p>4.3 Equilibrium of coplanar parallel and non-concurrent forces.</p> <p>4.4 Beams reactions - simply supported beams subjected to concentrated and uniformly distributed loads. Beam supported on roller and hinge supports.</p>	<p>Direct Instruction & Model Demonstration</p>	<p>CO1, CO3, CO4</p>
UNIT -V FRICTION (CL Hrs-07, Marks-12)				
5	<p>TLO 5.1: Friction and coefficient of Friction for the given condition.</p> <p>TLO 5.2: Describe the conditions for Friction for the give situation.</p> <p>TLO 5.3: Determine friction force in the given situation.</p> <p>TLO 5.4: Identify the various forces plane acting on a ladder for the given conditions using free body diagram.</p>	<p>5.1 Introduction to Friction.</p> <p>5.2 Types of friction, laws of static friction, coefficient of friction, angle of friction, and angle of repose.</p> <p>5.3 Equilibrium of body on horizontal & inclined planes.</p> <p>5.4 Ladder friction. (Numerical with smooth wall and Flooring rough or smooth to be only covered in theory.)</p>	<p>Direct Instruction & Model Demonstration</p>	<p>CO1, CO3, CO5</p>
UNIT -VI CENTROID AND CENTRE OF GRAVITY (CL Hrs-07, Marks-12)				
6	<p>TLO 6.1: Determine the centroid of geometrical plane figures and centre of gravity of the given simple solid.</p> <p>TLO 6.2: Calculate centroid of the given composite plane lamina.</p> <p>TLO 6.3: Determine centre of gravity of the given solids.</p> <p>TLO 6.4: Determine centre of gravity of the given composite solid.</p>	<p>6.1 Concept of Centre of Gravity & Centroid.</p> <p>6.2 Centroid of regular plane areas (triangular, circular, rectangular only) & compound areas consisting of maximum three regular plane areas.</p> <p>6.3 Centroid of hollow objects such as hollow cylinder, hollow cone, hollow sphere. (No</p>	<p>Direct Instruction & Model Demonstration</p>	<p>CO1, CO6</p>

	numerical to be set on hollow objects in theory paper.) 6.4 Centre of gravity of simple solids-cylinder, cone, sphere, and C.G of compound solid objects made up of any two solids.		
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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: Verification of Resolution and composition of Forces	1. To verify Law of polygon of Forces	2	CO1
2	LLO2 : Verification of Equilibrium of Forces	2. To verify Law of Moments. 3. To verify Lami's Theorem 4. To determine Beam Reactions 5. Graphic Statics: On Graph papers solve graphically two problems each on resultant of concurrent and parallel forces 6. Graphic statics- On Graph papers solve graphically Two problems on beam reactions	2 2 2 6 6	CO1, CO2, CO3, CO4
3	LLO3: Determine the Coefficient of Friction for various surfaces	7. To Determine coefficient of friction for different surfaces in contact (Minimum two different surfaces to be studied)	2	CO5
4	LLO4: Application of Law of machine for Lifting Machines	8. To study various lifting machines -To plot graphs for load Vs effort ,load Vs Efficiency and obtain law of machine for Differential axle and wheel, Worm and worm wheel, simple screw jack, Single purchase crab	2	CO2
5	LLO5: Practical Application of Knowledge of Applied Mechanics	9. Complete a micro project based on guidelines provided in Experiment No:07	2	CO1, CO2, CO3, CO4, CO5, CO6

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

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. She ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of PLOs, and TLOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than 15 (Fifteen) student engagement hours during the course.

In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that she contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty

- A. Types of Forces: Prepare chart showing real-life examples indicating various types of forces
- B. Lifting Machine Collect photographs of specific simple lifting machine and relate these machines with the machines being studied and prepare models of simple lifting machines using simple tools.
- C. Types of support: Prepare chart showing actual and corresponding schematic diagram of various type of support
- D. Beams: Prepare models of beam subjected to point loads, uniformly distributed loads simply supported, overhang and cantilever type beam.
- E. Friction: Prepare chart regarding type of friction in various field conditions.

Assignment

Other than the classroom and laboratory learning, following are the suggested student-related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

- a. Collect five different photographs indicating concurrent, parallel, general force system in equilibrium.
- b. Prepare a table of type of machine and relevant industrial application.
- c. Collect five different situations where law of moment plays an important role.
- d. Prepare models representing various types of supports (hinged, roller and fixed)
- e. Illustrate situations wherein friction is essential and not essential.
- f. Prepare models in the form of geometrical figures and solids and locate centroid and centre of gravity of them.

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Worm & worm wheel	1, 4
2	Single Purchase crab	1, 4
3	Differential Axle & wheel	1, 4
4	Parallel Forces Apparatus	2
5	Simple Screw Jack Indian makes.	4
6	Cast Iron weights and hangers	1, 2
7	Brass/Steel weights and Hangers	1, 2
8	Aluminum pulley with Bracket ,smoothly rotating	3
9	Combined Inclined Plane & friction slide ordinary	3
10	Law of moments apparatus	1, 2
11	Universal Force Table	1, 2
12	Sundry items like measuring scale, mirrors, thread, spirit levels, caliper.	1

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	Mechanics and force system	CO1	4	2	2	2	6
2	II	Simple Machines	CO2	7	2	4	6	12
3	III	Resolution and composition of Forces	CO1,CO3	10	2	4	8	14
4	IV	Equilibrium	CO1,CO3, CO4	10	2	2	10	14
5	V	Friction	CO1,CO3, CO5	7	2	4	6	12
6	VI	Centroid and Centre of Gravity	CO1, CO6	7	2	2	8	12
Grand Total				45	12	18	40	70

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
1. Tests 2. Rubrics for COs 3. Assignment 4. Self-Learning 5. Term Work	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	3	2	2	1	--	1	--	--
CO2	3	3	2	1	2	--	1	--	--	--
CO3	3	2	2	2	3	--	1	--	--	--
CO4	2	2	2	2	--	--	1	--	--	--
CO5	1	2	2	2	1	--	1	--	--	--
CO6	2	1	2	3	--	--	1	--	--	--

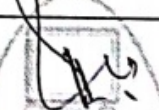

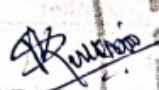
Legends:- High:03, Medium:02, Low:01, No Mapping: -
 *PSOs are to be formulated at the institute level

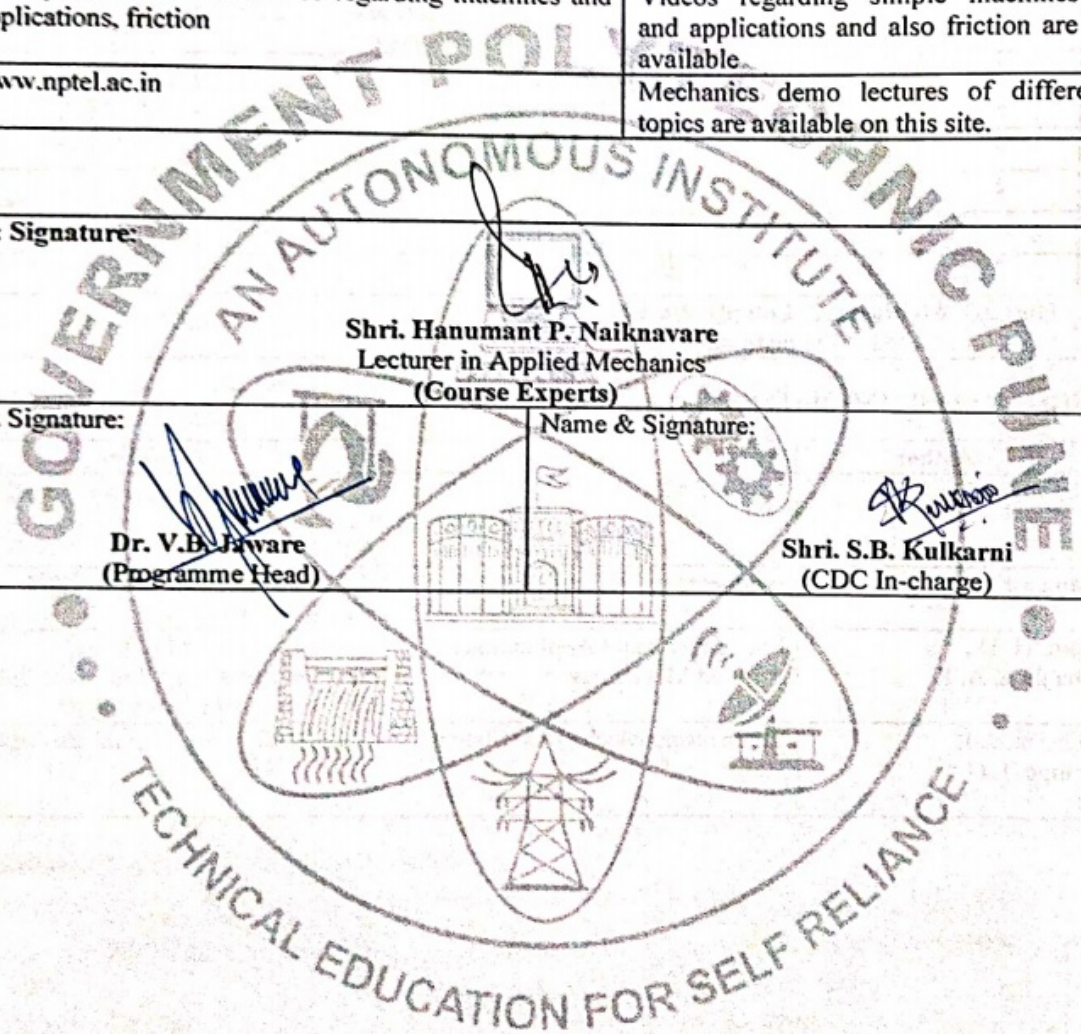
XI.SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No	Author	Title	Publisher
1	Khurmi, R.S	Applied Mechanics	S.Chand & Co. Publication New Delhi 2014 , ISBN 9788121916431
2	Ramamrutham, S. S	Engineering Mechanics	S.Chand & Co. New Delhi 2008 ISBN 9788187433514
3	Ram, H. D., Chauhan, A. K	Foundations and Applications of Applied Mechanics	Cambridge University Press, Thomson Press India Ltd. New Delhi, 2015. ISBN: 9781107499836
4	Meriam, J. L Kraige, L.G	Engineering Mechanics- Statics, Vol. 1	Wiley Publication, New Delhi ISBN 978-81-265-4396

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	http://giacr.ac.in	Lecture notes on engineering mechanics.
2.	www.coursera.org	Modules provided for engineering mechanics
3.	www.youtube.com for videos regarding machines and applications, friction	Videos regarding simple machines and applications and also friction are available.
4.	www.nptel.ac.in	Mechanics demo lectures of different topics are available on this site.

Name & Signature:  Shri. Hanumant P. Naiknavare Lecturer in Applied Mechanics (Course Experts)	
Name & Signature:  Dr. V.B. Jaware (Programme Head)	Name & Signature:  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 & TL					Based on SL					
			CL	TL	LL						Total	FA-PR		SA-PR		SLA		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>	Chalk and board Improved lecture, Tutorial Assignment, and Demonstration	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>	Chalk and board, Improved lecture, Tutorial Assignment, Demonstration	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	-			
CO6	3	2	-	3	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

Sl. No.	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.cheml.com	Chemistry instruction and education
4.	www.onlinelibrary.wiley.com	Materials and corrosion
5.	www.itsc.org	Catalysis

COURSE TITLE : ENGINEERING CHEMISTRY

Sr.No	Link/Portal	Description
6	www.chemcollective.org	Collection of virtual labs, scenario-based learning activities
7	www.wqer.org	Water Quality.
8	http://www.ancient-origins.net/history-famous-people/indian-sage-acharya-kanad-001399	IKS Philosophy of atom by Acharya Kanad.

Name & Signature:

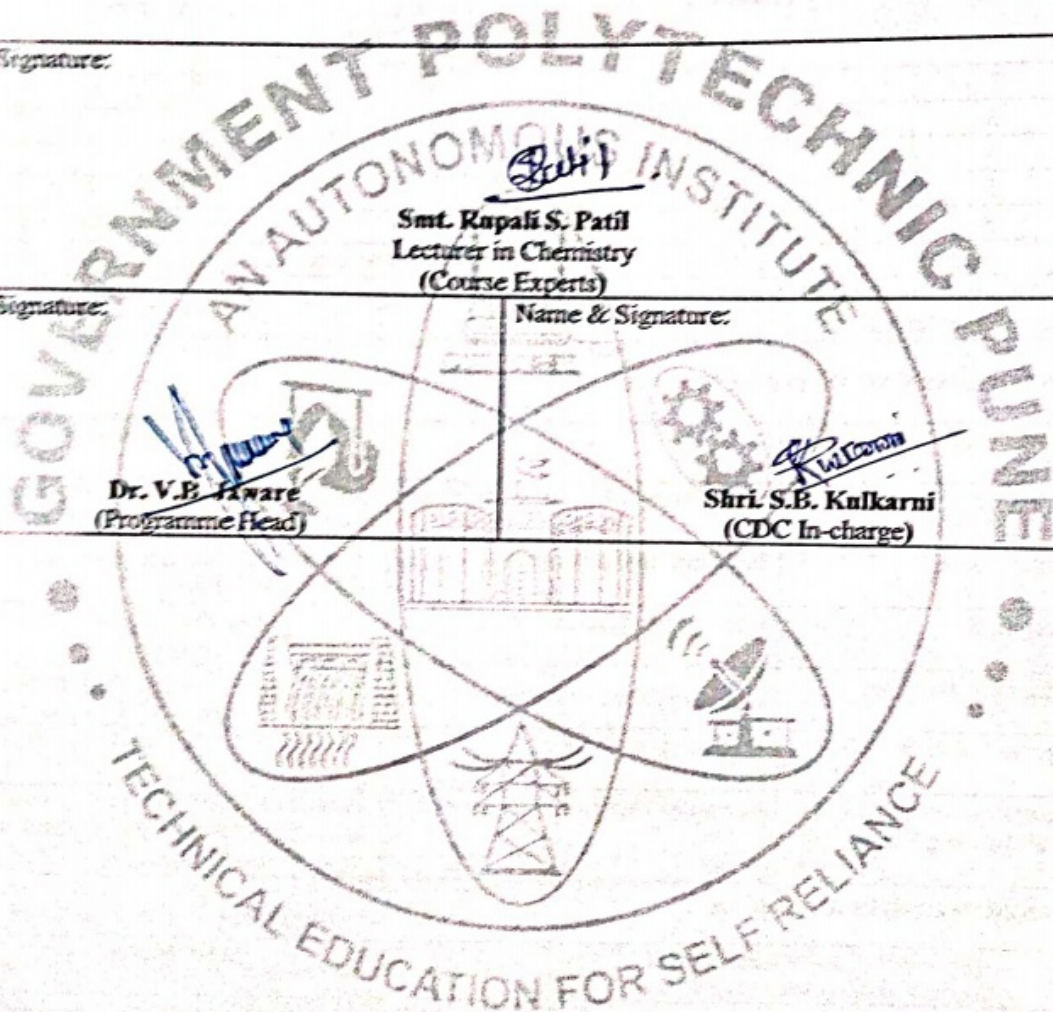
[Signature]
Smt. Rupali S. Patil
 Lecturer in Chemistry
 (Course Experts)

Name & Signature:

[Signature]
Dr. V.B. Saware
 (Programme Head)

Name & Signature:

[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			SLI	NLII			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, SLI-Self Learning Hours, NLII-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.	<p>TLO 1.1 Use transcription to pronounce words correctly.</p> <p>TLO 1.2 Use prefixes and suffixes for flexibility and precision in language.</p> <p>TLO 1.3 Employ synonyms and antonyms to express similarity and contrast between words.</p> <p>TLO 1.4 Use Homophones to expand their vocabulary.</p> <p>TLO 1.5 Make use of the collocations correctly.</p>	<p>1.1 Phonetics: Vowels (12), Consonants (24), Diphthongs (8)</p> <p>1.2 Prefix & Suffix: Definition & Examples, List of common prefixes and suffixes</p> <p>1.3 Synonyms & Antonyms: Vocabulary expansion, context & Usage</p> <p>1.4 Homophones: Identifying Homophones, Meaning & Context, Vocabulary Expansion</p> <p>1.5 Collocations: Definition & identification, types of collocations.</p>	<p>Language Lab Drill, Classroom learning, Reference Books & NPTEL.</p>	CO1
UNIT II PARAGRAPH AND DIALOGUE WRITING (CL Hrs. -06, Marks-12)				
2.	<p>TLO 2.1 Formulate paragraphs with Synchronized sentence structure on the given situation/topic.</p> <p>TLO 2.2 Develop dialogues to practice language skills in a structured and meaningful way.</p>	<p>2.1 Types of paragraphs: Technical, Descriptive and Narrative</p> <p>2.2 Dialogue Writing: i. Greetings ii. Development iii. Closing Sentence.</p>	<p>Classroom learning Skit, Language Lab, YouTube & videos</p>	CO2
UNIT III COMPREHENSION - SEEN AND UNSEEN PASSAGES (CL-Hrs. - 16, Marks-24)				
3.	<p>TLO 3.1 Respond to the given questions of the specified passage.</p> <p>TLO 3.2 Formulate sentences using new words</p> <p>TLO 3.3 Use correct syntax to construct meaningful sentences for the given situation.</p> <p>TLO 3.4 Interpretation of passages in written and Spoken Form.</p>	<p>3.1 Passages from MSBTE workbook</p> <ol style="list-style-type: none"> Say No to Plastic bags Interview of Dr. APJ Abdul Kalam Maximum Achievements Be Remarkable Arunima Sinha: A Biography Roses of Gratitude <p>3.2 Importance of Comprehension</p> <p>3.3 Unseen Passages</p> <p>3.4 Interpretation of passages in written and Spoken Form.</p>	<p>Classroom learning, interactive sessions & discussion</p>	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	LLO 1.1 Use transcription in the correct form. LLO 1.2 Learn to differentiate vowels, diphthongs and consonants.	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

COURSE TITLE : COMMUNICATION SKILLS (ENGLISH)

COURSE CODE: HU11201

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

COURSE TITLE : COMMUNICATION SKILLS (ENGLISH)

COURSE CODE: HU11201

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: 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

COURSE TITLE : COMMUNICATION SKILLS (ENGLISH)

COURSE CODE: HU11201

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

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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			



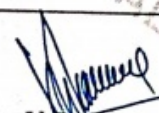

Legends:- High:03, Medium:02, Low:01, No Mapping: -
*PSOs are to be formulated at the institute level

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. Y.V. Kulkarni Lecturer in English	 Dr. S.P. Palve Lecturer in English
(Course Experts)	
Name & Signature:	Name & Signature:
 Dr. V.D. Paware (Programme Head)	 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	Total	Practical				SLA				
													FA-PR	SA-PR	SLA	SLA	Max	Min	Max	Min	
ME11201	ENGINEERING GRAPHICS	DSC	2	-	-	-	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, @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:

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 (CO's)

Students will be able to achieve & demonstrate the following CO's 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: Draw isometric views of given component from orthographic projections

COURSE TITLE : ENGINEERING GRAPHICS

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 L 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>TLO 4.3 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. (For branches other than mechanical Engineering, the teacher should select branch-specific elements.</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. (For branches other than mechanical Engineering, the teacher should select branch-specific elements for freehand sketching)</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-degree, 45-degree, 60- & 75-degree lines using Tee and Set squares/ 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 four Engineering Curves (Sketchbook)	2	CO1
6	LLO 6.1 Identify different Engineering curves LLO 6.2 Draw different types of curves	Draw any four 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)	4	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)	2	CO3

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
13	LSO 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	LSO 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 10 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:

Assignment: -

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 on the MSBTE portal to be used as references/standards.	All

6	Drawing equipment and instruments for classroom teaching-large size: a. T-square or drafter (Drafting Machine). b. Set squares (450 and 300-600) c. Protector. d. Drawing instrument box (containing set of compasses and dividers). Drawing sheets, Drawing pencils, 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	CO3,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. Term Work	End Term Practical 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	-	-	2	-	2	2			
CO2	3	-	-	2	-	2	2			
CO3	3	-	-	2	-	2	2			
CO4	3	-	-	2	-	2	2			
CO5	3	-	-	2	-	2	2			

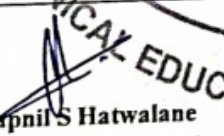
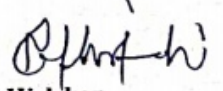


Legends:- High:03, Medium:02, Low:01, NoMapping: -
*PSOs are to be formulated at the institute level

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. 978-93-91505-80-9

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=8j71OWhMIE	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.aware (Programme Head)	 Shri.S.B.Kulkarni (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE
'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN ME/MT
PROGRAMME CODE	04/05
COURSE TITLE	ENGINEERING WORKSHOP PRACTICE
COURSE CODE	WS11204
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						Practical				SLA				
											FA-TH	SA-TH	Total		FA-PR	SA-PR	Max		Min
WS11204	ENGINEERING WORKSHOP PRACTICE	SEC	-	-	4	-	4	2	-	-	-	-	50	20	50@	20	-	-	100

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, @S - 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:

Workshop Practice is a basic engineering course. The knowledge of basic shops like woodworking, fitting, welding, plumbing and sheet metal shops is essential for a technician to perform his/her duties in industries. Students can perform various operations using hand tool equipment and machinery in various shops. Working in a workshop develops the attitude of group working and safety awareness. This course provides an industrial environment in the educational institute.

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 firefighting tools and equipment.
- CO2: Prepare the job using different tools in the fitting shop.
- CO3: Perform various operations using plumbing and carpentry tools
- CO4: Prepare various welding joints.
- CO5: Produce simple jobs using different sheet metal operations

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 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 Show first aid box Hands-on practice Video Demonstrations</p>	CO1
UNIT-II FITTING (CL Hrs-Nil, Marks-Nil)				
2	<p>TLO 2.1 Identify fitting tools</p> <p>TLO 2.2 Explain the operation of fitting shop machines</p> <p>TLO 2.3 Use fitting tools</p> <p>TLO 2.4 Operate Machineries.</p> <p>TLO 2.5 Perform fitting operations</p> <p>TLO 2.6 Maintain tools, equipment and types of machinery.</p>	<p>2.1 Fitting hand tools bench vice, hammers, chisels, files, hacksaw, surface plate, punch, v block, angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set and their Specifications</p> <p>2.2 Operation of fitting shops machinery - Drilling machine, Power saw, grinder their specifications and maintenance.</p> <p>2.3 Basic process chipping, filing, scraping, grinding, marking, sawing, drilling, tapping, Dieing reaming etc.</p>	<p>Model 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 PLUMBING (Cl. Hrs-Nil, Marks-Nil)				
3	TLO 3.1 Identify plumbing tools. TLO 3.2 Explain the operation of fitting shop machines. TLO 3.3 Use plumbing tools TLO 3.4 Operate machineries. TLO 3.5 Perform plumbing operations TLO 3.6 Maintain tools, equipment and types of machinery.	3.1 Plumbing hand tools pipe vice, pipe bending equipment, pipe wrenches, dies and their Specifications. 3.2 Pipe fittings- bends, elbows, tees, cross, coupler, socket, reducer, cap, plug, nipple and their Specifications. 3.3 Operation of types of Machinery in plumbing shops- pipe bending machines their specifications and maintenance. Basic process cutting, threading.	Model Demonstration	CO3
UNIT- IV METAL JOINING (Cl. Hrs-Nil, Marks-Nil)				
4	TLO 4.1 Identify metal joining tools. TLO 4.2 Explain the gas and arc welding procedure TLO 4.3 Use metal joining tools. TLO 4.4 Perform welding, soldering, and brazing operations TLO 4.5 Maintain tools, equipment and types of machinery.	4.1 Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush and their Specifications 4.2 Operation of types of machinery in welding shops- arc welding transformer their specifications and maintenance. Welding Electrode, filler rod, fluxes, and solders.	Video Demonstrations Demonstration	CO3
UNIT -V CARPENTRY (Cl. Hrs-Nil, Marks-Nil)				
5	TLO 5.1 Select woodworking tools per job requirement. TLO 5.2 Explain the operation of woodworking machines TLO 5.3 Use furniture-making tools TLO 5.4 Operate machineries. TLO 5.5 Perform woodworking operations TLO5.6 Maintain tools, equipment and types of machinery.	5.1 Types of artificial woods such as plywood, blockboard, hardboard, laminated boards, Veneer, and fiber Boards and their applications. 5.2 Woodworking hand tools carpentry vice, marking and measuring tools, saws, claw hammer, mallet, chisels, planes, squares, and their specifications 5.3 Operation of woodworking types of machinery - Wood turning lathe, circular saw, their specifications and maintenance. 5.4 Basic process- marking, sawing, planning, chiselling, turning, grooving, boring.	Demonstration	CO4

UNIT –VI SHEET METAL (CL Hrs-Nil, Marks-Nil)			
6	<p>TLO 6.1 Identify sheet metal tools.</p> <p>TLO 6.2 Explain the operation of sheet metal types of machinery.</p> <p>TLO 6.3 Use sheet metal tools</p> <p>TLO6.4 Operate sheet metal types of machinery.</p> <p>TLO 6.5 Perform bending operations Maintain tools, equipment and types of machinery.</p>	<p>6.1 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>6.2 Operation of types of machinery in sheet metal shops- sheet cutting and bending machine and its specifications and maintenance.</p> <p>6.3 Basic process- marking, bending, folding, edging, seaming, staking, riveting.</p>	<p>CO6</p> <p>Demonstration</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 a fire extinguisher	Identify fire extinguishers according to their specification	2	CO1
2	LLO 2.1 Operate fire extinguisher	Perform mock drill sessions in groups of a minimum of 10 students for extinguishing fire.	2	CO1
3	LLO 3.1 Identify different tools used in the workshop.	Identify different tools used in the workshop.	2	CO1 CO2 CO3 CO4 CO5
4	LLO 4.1 Select proper fitting tools LLO 4.2 Prepare fitting job using different tools.	Prepare the job using the following operations:part I a. Marking operation as per drawing b. punching operation as per drawing c. Filing operation as per drawing d. sawing operation as per drawing e. drilling operation as per drawing f. tapping operation as per drawing	6	CO2
5	LLO 5.1 Select proper plumbing tools LLO 5.2 Use plumbing operations for preparing plumbing joints	Prepare T-joint pipe fitting job as per the given drawing (individually)	4	CO3
6	LLO 6.1 Select proper plumbing tools LLO 6.2 Use plumbing operations for preparing plumbing joints	Prepare elbow joint pipe fitting job as per the given drawing(individually)	4	CO3
7	LLO 7.1 Develop a list of different components as per the specification	Prepare bill of material for given pipeline layout (individually)	2	CO3

8	LLO 8.1 Obey safety rules employed in the welding shop.	Practice different safety rules in the welding shop as per the given instructions.	2	CO4
9	LLO 9.1 Prepare various welded joints using different welding processes.	Prepare lap joint using arc welding as per the given drawing (individually)	4	CO4
10	LLO 10.1 Prepare various welded joints using different welding processes.	Prepare butt joint using arc welding as per the given drawing (individually)	4	CO4-
11	LLO 11.1 Assemble utility jobs using different manufacturing processes.	Prepare utility jobs (like stools, benches, tables or similar jobs) involving arc welding and artificial wood as per the given drawing (in a group of 4 to 5 students) Fabrication operation involves measuring, marking, cutting, edge preparation, welding	8	CO3 CO4
12	LLO 12.1 Select proper sheet metal tools LLO 12.2 Prepare sheet metal components using different operations.	Prepare sheet metal utility job using following operations a. Cutting And Bending b. Edging c. End curling d. Lancing e. Soldering f. Riveting	6	CO5
13	LLO 13.1 Collect information about ancient tools for understanding Indian Knowledge.	Draw sketches of various ancient tools	2	CO1 CO2 CO3 CO4 CO5

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

NOT APPLICABLE

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
2	Fire extinguisher A, B and C types	1,2
3	Wood Turning Lathe Machine, Height of Centre: 200mm, Distance between Centers: 1200mm, Spindle Bore: 20mm with Taper, Range of Speeds: 425 to 2800 with suitable Motor Drive. with all accessories	11
4	Circular Saw Machine, Diameter of saw blade 200 mm, Maximum Depth of Cut 50 mm, Table Size -350 x 450 mm, Table Tilting – 450	11
5	Woodworking tools- marking and measuring tools, saws, claw hammers, mallets, chisels, plans, squares	11

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
6	Carpentry Vice 200 mm	11
7	Work Benches- size:1800 x 900 x 750 mm	4
8	Bench Drilling machine (up to 13 mm drill cap) with ½ H.P. Motor, 1000 mm height.	4
9	Power Saw machine 350 mm mechanical with 1 HP Motor & all Accessories.	4
10	Bench Grinder 200 mm Grinding Disc diameter 200 mm. with 25 mm. bore 32 mm. with ½ HP/1HP Motor.	4
11	Vernier height Gauge 450 mm	4,5,6,8
12	Surface Plate 600 x 900 mm Grade I	4,5
13	Angle Plate 450 x 450 mm	4,5
14	Welding machine 20 KVA 400A welding current 300A at 50, 100, 200, 250, 300 with std. Accessories and Welding Cable 400 amp. ISI with holder	8,9,10,11
15	Oxygen and acetylene gas welding and cutting kit with cylinders and regulators.	8,9,10,11
16	Pipe Bending Machine	5,6
17	Pipe Vice – 100 mm	5,6
18	Pipe Cutter- 50 mm	5,6
19	Bench Vice 100 mm	5,6
20	Portable Hammer Drill Machine 0-13 mm A.C. 230 V, 2.5Amp, Pistol type, having different types of bits	4
21	Sheet Bending Machine	12
22	Sheet Cutting Machine	12
23	Brazing Equipment	12
24	Fitting tools - hammers, chisels, files, hacksaw, surface plate, punch, y block, angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set.	3,4
25	Plumbing tools- pipe vice, pipe bending equipment, pipe wrenches, dies.	3,5,6
26	Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush.	8,9,10,11
27	Sheet metal hand tools- snip, shears sheet gauge, straight edge, L square, scribe, divider, trammel, punches, pliers, stakes, groovers, limit set	12

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)
Assignment and Terms work	Lab 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	3	3	1			
CO2	3	-	-	3	2	3	-			
CO3	3	-	-	3	2	3	1			
CO4	3	-	-	3	2	3	1			
CO5	3	-	-	3	2	3	1			

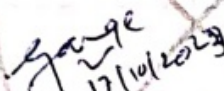
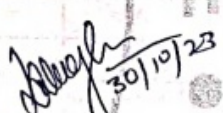

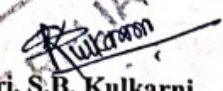
Legends:- High:03, Medium:02, Low:01, No Mapping:-
*PSOs are to be formulated at the institute level

XI. SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No	Author	Title	Publisher
1	Bawa, H.S.	Workshop Practice	McGraw Hill Education, Noida; ISBN-10: 0070671192 ISBN-13: 978-0070671195
2	Gupta, J.K.; Khurmi, R.S.	A Textbook of Manufacturing Process (Workshop Tech.)	S.Chand and Co. New Delhi ISBN:81-219-3092-8
3	Hegde, R.K.	Workshop Practice Manual For Engineering Diploma & ITI Students	Sapna Book House, 2012, ISBN:13: 9798128005830
4	Singh, Rajender	Introduction to Basic Manufacturing Process & Workshop Technology	New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7
5	Hajra; Choudhary	Elements of Workshop Technology	Media Promoters and Publishers Mumbai, 2009, ISBN: 10-8185099146
6	Sarathe, A.K	Engineering Workshop Practice	Khanna Book Publishing CO(P) LTD, New Delhi, ISBN No. 978-93-91505- 51-6

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	http://www.asnu.com.au	Basic engineering tools.
2.	http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf	Woodworking
3.	http://www.weldingtechnology.org	Welding techniques
4.	http://www.newagepublishers.com/samplechapter/001469.pdf	Basic engineering tools.
5.	http://www.youtube.com/watch?v=TeBX6cKHWY	Welding techniques
6.	http://www.youtube.com/watch?v=QHF0sNHnttw&feature=related	Welding techniques
7	http://www.youtube.com/watch?v=KvIzo9CAxt4&feature=relmfu	Woodworking
8	http://www.piehtoolco.com	Basic engineering tools.
9	http://sourcing.indiamart.com/engineering/articles/materials-used-hand-tools/	Basic engineering tools.
10	https://www.youtube.com/watch?v=9_cnkaAbtCM	Basic engineering tools.

Name & Signature:	
 Mr. Pushpak U. Garge Lecturer in Mechanical Engineering & I/C Workshop Superintendent	 Mrs. D.S. Waghmare 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/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	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.

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:

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>TLO 3.4 Write steps to</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</p>	Hands-on Demonstration Presentations	CO3

<p>create charts for the given data set. TLO 3.5 Explain steps to perform data filter, sort and validation operations on the given data set. TLO 3.6 Write steps to set up and print a spreadsheet.</p>	<p>Comments, Add Text Box, Undo Changes, - Freeze 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. 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. 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. 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>		
<p>UNIT- IV PRESENTATION TOOL (CL Hrs-04, Marks-NIL)</p>			
<p>TLO 4.1: Write the steps to create the given slide presentation. TLO 4.2: Write the steps to insert multiple media in the given presentation. TLO 4.3: Explain the method of including animation, and transition effects in a slide show. TLO 4.4: Write steps to apply table features in the given presentation 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. 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. 4.3 Working with Tables: Insert a Table in a Slide, Format Tables, and Import Tables from Other Office Applications. 4.4 Working with Charts: Insert Charts in a Slide, Modify a Chart, and Import Charts from Other Office Applications.</p>	<p>Hands-on Demonstration Presentations</p>	<p>CO4</p>

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

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
6	LLO 6.1 Enter and format data in a worksheet. LLO 6.2 Insert and delete cells, rows and columns LLO 6.3 Apply alignment feature on cell	Create, open and edit Worksheet.	2	CO3
7	LLO 7.1 Create formula and "IF" condition on cell data LLO 7.2 Apply various functions and named ranges in the worksheet.	Formulas and functions in Worksheet.	2	CO3
8	LLO 8.1 Implement data Sorting, Filtering and Data validation features in a worksheet.	Sort, Filter and validate data in Spreadsheet.	2	CO3
9	LLO 9.1 Create charts using various chart options in a spreadsheet.	Charts for Visual Presentation in Spreadsheet.	2	CO3
10	LLO 10.1 Print the worksheet by applying various print options for the worksheet	Worksheet Printing.	2	CO3
11	LLO 11.1 Apply design themes to the given presentation. LLO 11.2 Insert pictures text/images/shapes in slide LLO 11.3 Use pictures text/images/shapes editing options.	Make Slide Show Presentation.	2	CO4
12	LLO 12.1 Add tables and charts in the slides. LLO 12.2 Run slide presentation in different modes LLO 12.3 Print slide presentation as handouts/notes	Use Tables and Charts in Slide	2	CO4
13	LLO 13.1 Apply animation effects to the text and slides LLO 13.2 Add/set audio and video files in the presentation.	a) Insert Animation effects into Text and Slides. b) Insert Audio and Video files in the presentation	2	CO4
14	LLO 14.1 Configure internet connection on a computer system LLO 14.2 Use different web services on the internet	a) Internet connection configuration b) Use Internet and Web Services.	1	CO5
15	LLO 15.1 Configure different browser settings LLO 15.2 Use browsers for the given purpose	Working with Browsers.	1	CO5
16	LLO 16.1 Create web forms for surveys using different options.	Prepare Web Forms for Survey.	1	CO5
17	LLO 17.1 Create web forms for Quiz using different options	Prepare Web Forms for Quiz	1	CO5

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
CO1	1	-	-	-	-	-	1	2	-
CO2	-	-	-	3	-	-	1	-	-
CO3	-	2	1	3	-	-	1	-	3
CO4	-	-	-	3	-	-	1	-	-
CO5	1	-	-	3	-	-	3	2	-

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

XI. SUGGESTED LEARNING MATERIALS/BOOKS

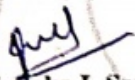
Sr.No	Author	Title	Publisher
1	Goel, Anita	Computer Fundamentals	Pearson Education, New Delhi, 2014, ISBN-13: 978-8131733097
2	Miller, Michael	Computer Basics Absolute Beginner's Guide, Windows 10	QUE Publishing; 8th edition August 2015, ISBN: 978-0789754516
3	Alvaro, Felix	Linux: Easy Linux for Beginners	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
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

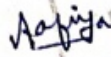
XIII. LEARNING WEBSITES & PORTALS

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-7bed85e6-2c3d-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:



Mrs. Priyanka L. Sonwane
 Lecturer in Information Technology


Mrs. Aafiya A. Shaikh
 Lecturer in Computer Engineering

(Course Experts)

Name & Signature:


Mrs. J. R. Hange
 (Programme Head)


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

Name & Signature:

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 I.L. & 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							
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.@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:

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, Bhāradwajasana. 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 Kapalbhathi Pranayam Kriya Lab Exp: 10 Practice Bhramary Pranayam.	5	CO3

COURSE TITLE : YOGA AND MEDITATION

COURSE CODE: HU21201

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:

(S.P. Dake)
 (Course Experts)

Name & Signature:

(Dr. V.B. Jaware)
 Dr. V.B. Jaware
 (Programme Head)

Name & Signature:

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