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	Assessment Scheme										
			Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TSL				Based on SL		Total Marks
														Practical						
			CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
										Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
HU 11201	COMMUNICATION SKILLS (ENGLISH)	AEC	03	-	02	01	06	03	03	30	70	100	40	25	10	--	--	25	10	150

Total IKS Hrs for Term: 0 Hrs

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

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

Note:

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

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

II. RATIONALE:

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

III. COURSE-LEVEL LEARNING OUTCOMES (COS)

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

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

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes (TLO's) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
	UNIT I VOCABULARY (CL Hrs. -10, Marks-12)			
1.	TLO 1.1 Use transcription to pronounce words correctly. TLO 1.2 Use prefixes and suffixes for flexibility and precision in language. TLO 1.3 Employ synonyms and antonyms to express similarity and contrast between words. TLO 1.4 Use Homophones to expand their vocabulary. TLO 1.5 Make use of the collocations correctly.	1.1 Phonetics: Vowels (12), Consonants (24), Diphthongs (8) 1.2 Prefix & Suffix: Definition & Examples, List of common prefixes and suffixes 1.3 Synonyms & Antonyms: Vocabulary expansion, context & Usage 1.4 Homophones: Identifying Homophones, Meaning & Context, Vocabulary Expansion 1.5 Collocations: Definition & identification, types of collocations.	Language Lab Drill, Classroom learning, Reference Books & NPTEL.	CO1
	UNIT II PARAGRAPH AND DIALOGUE WRITING (CL Hrs. -06, Marks-12)			
2.	TLO 2.1 Formulate paragraphs with Synchronized sentence structure on the given situation/topic. TLO 2.2 Develop dialogues to practice language skills in a structured and meaningful way.	**2.1 Types of paragraphs:** Technical, Descriptive and Narrative **2.2 Dialogue Writing:** i. Greetings ii. Development iii. Closing Sentence.	Classroom learning Skit, Language Lab, YouTube & videos	CO2
	UNIT III COMPREHENSION - SEEN AND UNSEEN PASSAGES (CL-Hrs. - 16, Marks-24)			
3.	TLO 3.1 Respond to the given questions of the specified passage. TLO 3.2 Formulate sentences using new words TLO 3.3 Use correct syntax to construct meaningful sentences for the given situation. TLO 3.4 Interpretation of passages in written and Spoken Form.	3.1 Passages from MSBTE workbook 1. Say No to Plastic bags 2. Interview of Dr. APJ Abdul Kalam 3. Maximum Achievements 4. Be Remarkable 5. Arunima Sinha: A Biography 6. Roses of Gratitude 3.2 Importance of Comprehension 3.3 Unseen Passages3.4 Interpretation of passages in written and Spoken Form.	Classroom learning, interactive sessions & discussion	CO3

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

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

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

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

Micro project

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

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

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

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

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

IX. ASSESSMENT METHODOLOGIES/TOOLS

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

X. SUGGESTED COS- POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes(POs)							Programme Specific Outcomes *(PSOs)		
	PO-1 Basic and Discipline-Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-
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:

Mr. V.V. Kulkarni
Lecturer in English

Dr. S. P. Palve
Lecturer in English

(Course Experts)

Name & Signature:

Dr. D.N. Rewadkar
(Programme Head)

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GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN ET / CM / IT
PROGRAMME CODE	03/ 06 / 07
COURSE TITLE	ENGINEERING GRAPHICS
COURSE CODE	ME11202
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Assessment Scheme										
			Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory			Based on LL & TSL				Based on SL		Total Marks
													Practical						
			CL	TL	LL					FA-TH	SA-TH	Total	FA-PR		SA-PR		SLA		
										Max	Max	Max	Max	Min	Max	Min	Max	Min	
ME11202	ENGINEERING GRAPHICS	DSC	2	-	4	-	6	3	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: Apply basic CAD commands for drawing different entities.

CO4: Use various drawing codes, conventions and symbols as per IS SP-46 in engineering drawing.
CO5: Draw free-hand sketches of given engineering elements.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
	UNIT-I BASIC ELEMENTS OF DRAWING (CL Hrs-04, Marks-04)			
1.	TLO 1.1 Prepare drawing using drawing instruments. TLO 1.2 Use IS SP-46 for dimensioning TLO 1.3 Use different types of lines. TLO 1.4 Draw regular geometrical figures. TLO 1.5 Draw figures having tangency constructions.	1.1 Drawing Instruments and supporting material: method to use them with applications. 1.2 Standard sizes of drawing sheets (ISO-A series) 1.3 I.S. codes for planning and layout. 1.4 Letters and numbers (single stroke vertical) 1.5 Convention of lines and their applications. 1.6 Scale - reduced, enlarged & full size 1.7 Dimensioning techniques as per SP-46 (Latest edition) – types and applications of chain, parallel and coordinate dimensioning 1.8 Geometrical constructions	Model Demonstration	CO1, CO4
	UNIT-II ENGINEERING CURVES AND 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, CO4

	UNIT-III ORTHOGRAPHIC PROJECTIONS (CL Hrs-08, Marks-14)			
3	TLO 3.1 Explain methods of Orthographic Projections. TLO 3.2 Draw orthographic views of simple 2D entities containing lines, circles and arcs only. TLO 3.3 Draw the orthographic views from given pictorial views. TLO 3.4 Use of IS code IS SP-46 for dimensioning technique.	3.1 Introduction of projections- orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination) 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)	Model Demonstration Video Demonstrations	CO2, CO4
	UNIT- IV COMPUTER AIDED DRAFTING (CL Hrs-08, Marks-14)			
4	TLO 4.1 Draw basic 2D entities in Auto CAD software TLO 4.2 Modify and edit the given commands. TLO 4.3 Prepare a 2D drawing of the given simple engineering components using Auto CAD software. TLO 4.4 Print given drawing using printer/ plotter	4.1 Basic entities: line, circle, arc, polygon, ellipse, rectangle, multiline, polyline. 4.2 Commands: trim, delete, copy, offset, array, block, layers. 4.3 Dimensioning: linear, horizontal, vertical, aligned, rotated, baseline, continuous, diameter, radius, angular dimensions. 4.4 Text: Single line, multiline. 4.5 Standard sizes of the sheet, selecting various plotting parameters such as paper size, paper units, drawing orientation, plot scale, plot offset, plot area, and print preview.	Presentations, Video Demonstrations	CO3, CO4
	UNIT –V FREE HAND SKETCHES OF ENGINEERING ELEMENTS (CL Hrs-04, Marks-06)			
5	TLO 5.1 Sketch proportionate freehand sketches of given machine elements. TLO 5.2 Select proper fasteners and locking arrangement.	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).	Model Demonstration	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 Use drawing instruments	Draw horizontal, vertical, 30-degree, 45-degree, 60- & 75-degree lines using Tee and Set squares/ drafter. (Sketch Book).	2	CO1
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

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
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 Apply CAD commands for drawing different entities.	Draw basic 2D entities like rectangles, rhombi, polygons, arcs, and circles using CAD. Commands.	4	CO3
12	LLO 12.1 Apply CAD commands for drawing different entities.	Draw basic 2D entities using rectangular and circular arrays.	2	CO3
13	LLO 13.1 Apply CAD commands for drawing different entities.	Draw basic branch-specific components using CAD commands	2	CO3 CO4
14	LLO 14.1 Apply CAD commands for drawing different entities.	Draw complex branch-specific components using CAD commands.	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	2	CO2

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
		objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views (sketchbook).		CO4
16	LLO 16.1 Draw standard discipline-oriented components using free hand.	Draw freehand Sketches of 12 different standard components (Sketchbook)	2	CO5
17	LLO 17.1 Draw standard discipline-oriented components using free hand.	Draw freehand Sketches of 12 different standard components (1 Sheet)	2	CO5
18	LLO 18.1 Collect information on an ancient Indian culture related to engineering graphics	Correlate ancient Indian sculptures, Indian-temples, Monuments, etc. with Engineering Graphics	2	CO1 CO2 CO3 CO4 CO5

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

Micro project:

NA

Assignment:-

NA

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Drawing Table with Drawing Board of Full-Imperial/ A1 size.	All
2	Models of objects for orthographic projections	7,8,9,10
3	Models/ Charts of objects mentioned in unit no. 5	16,17
4	Set of various industrial drawings being used by industries.	All
5	A set of drawing sheets mentioned in section 6.0 could be developed by experienced teachers and made available 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 squires (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
7	CAD Workstation: 2GB RAM, 320 GB HDD, 17" screen, 1GHz (Minimum Requirement)	11,12,13,14

8	Plotter: Print Resolution up to 1200X600 Dpi, 16 MB Memory	11,12,13,14
9	Licensed Latest Network of AutoCAD Software	11,12,13,14

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	I	Basic Elements of Drawing	CO1	4	0	0	4
2	II	II	Engineering curves and loci of Points.	CO1	6	0	0	14
3	III	III	Orthographic projections	CO2, CO4	8	0	0	16
4	IV	IV	Computer Aided Drafting	CO3, CO4	8	0	0	06
5	V	V	Free Hand Sketches of Engineering Elements	CO4, CO5	4	0	0	10
		Grand Total		30	0	0	50	50

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
1. Term Work	1. 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	-			
CO2	3	-	-	2	-	2	-			
CO3	3	-	-	2	-	2	-			
CO4	3	-	-	2	-	2	2			
CO5	3	-	-	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. 978-93-91505-50-9
7	Jeyapoovan T	Engineering Drawing and Graphics using AutoCAD	Vikas Publishing House Pvt. Ltd., First Reprint 2013, ISBN NO.978-81259-4000-5
8	Salunkhe R	AutoCAD 2013 2D & 3D for Civil and Mechanical Engineering	Aruta Publishers Chiplun, 2013, ISBN No. 978-81-902648-1-5

XIII. 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=3WXPahCq9LI	Basics of Projection
4.	https://www.youtube.com/watch?v=fvjk7PlxAu0	Introduction to Engineering Graphics
5.	https://www.youtube.com/watch?v=cmR9cfWJRUU	Basics of AutoCAD

Name & Signature: **Mr. M.R Mundhe** Lecturer in Mechanical Engineering (Course Experts)	**Mr. R. S.Solanke** Lecturer in Mechanical Engineering
Name & Signature: **Dr. D.N.Rewadkar** (Programme Head)	Name & Signature: **Shri. S.B.Kulkarni** (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN EE/ET/CM/IT
PROGRAMME CODE	02/03/06/07
COURSE TITLE	ENGINEERING PHYSICS
COURSE CODE	SC11203
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Assessment Scheme										
			Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TSL				Based on SL		Total Marks
														Practical						
			CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
										Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
SC11203	ENGINEERING PHYSICS	DSC	3	-	2	1	6	3	2	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,@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:

This course is designed in a way by which fundamental information will help the diploma engineers to apply the basic principles and concepts of physics to solve broad-based engineering problems. The study of basic principles and concepts of motion, light, electricity, and modern physics will help in understanding the technology courses where the emphasis is on the applications of these in different technology applications.

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: Estimate errors in measurement and Apply laws of motion in various applications.
CO2: Use basic principles of electrostatics in the engineering field
CO3: Apply basic principles of electricity to solve engineering problems.
CO4: Apply basic principles of magnetism to solve engineering problems
CO5: Use basic principles of light in the technical field
CO6: Apply principles of X-rays and Photoectricity in Engineering.

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 GENERAL PHYSICS (CL Hrs-07, Marks-10)			
1.	**TLO 1.1:** . List fundamental and derived quantities with their unit. Explain the procedure of measuring the dimensions of a given object by using Vernier Calipers and Screw Gauge.	**1.1. Units and Measurement** Introduction, Definition of unit, Fundamental and derived units, Different System of units, Errors in measurements. Dimensions and its Application Application of Vernier Caliper and Screw Gauge. **1.2 Types of Motion** Displacement, Velocity, Acceleration and retardation Angular displacement, Angular velocity, Angular acceleration and Units. Three equations of angular motion. SHM and its application.	Chalk and board Improved lecture, Tutorial Assignment, and Demonstration	**CO1**
	UNIT-II ELECTROSTATICS (CL Hrs-09, Marks-14)			
2	**TLO 2.1** Describe properties of electric lines of force. **TLO 2.2** Calculate electrostatic force, electric field and electric potential difference of the given static charge. **TLO 2.3** Calculate the equivalent capacity and energy stored in the combination of the capacitors.	**2.1 Electric charge**, Coulomb's law in Electrostatics, a unit of charge, electric field, intensity of electric field, electric lines of forces (Properties), electric flux, flux density, analytical treatment. **2.2 Electric potential:** Explanation, Definition, Potential due to a point charge, potential due to a charged sphere, potential of the earth, absolute electric potential, analytical treatment. **2.3 Electric Capacitor:** Capacitance Introduction of conductor, unit, principle of condenser, parallel plate condenser, capacitances in series and parallel, Super Capacitors and Application, analytical treatment.	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 CURRENT ELECTRICITY (CL Hrs-09, Marks-14)			
3	**TLO 3.1.** State and Explain Ohm's law. **TLO 3.2.** Explain the principle of the potentiometer and its application.	**3.1 Current**, Resistance and its unit, Law of Parallel and Series combination of resistance, Dependence of resistance-length, area of cross-section, temperature, Ohms law, specific resistance and its unit, Whetstone's network construction and principle, Meter bridge, Balancing condition of meter bridge, Measurement of unknown resistance using meter bridge, analytical treatment. **3.2 Potentiometer,** Principle of the potentiometer, Potential gradient, Construction of potentiometer, Applications of potentiometer, E.M.F., Comparison of E.M.F. using potentiometer.	Chalk and board, Improved lecture, Tutorial Assignment, Demonstration	CO3
	UNIT- IV MAGNETISM (CL Hrs-05, Marks-08)			
4	TLO.4.1. Calculate Magnetic induction for the given conductor. TLO 4.2 Explain Electromagnetism with its applications.	**4.1 Magnetic effect of electric current,** Magnetism, Intensity of magnetic field, Magnetic induction, Magnetic Flux, Magnetic lines of force and its Properties, Analytical treatment. **4.2Electromagnetism** and its application.	Simulation, Model Display, Demonstration Chalk and board, Presentations.	CO4
	UNIT –V OPTICS AND LASER (CL Hrs-07, Marks-12)			
5	**TLO 5.1.** State laws of reflection and refraction. Describe the phenomenon of total internal reflection. **TLO 5.2** Distinguish between optical fibre communication systems and ordinary systems. **TLO 5.3** Differentiate between properties of ordinary light and laser light. State applications of laser in different fields	**5.1 Light:** Introduction to reflection and refraction of light, Laws of reflection and refraction, Snell's law, Refractive index, Physical significance of refractive index, Critical angle, Total internal refraction of light, analytical treatment. **5.2 Fiber optics**: Propagation of light through optical fibre, Structure of optical fibre, Numerical aperture, Acceptance angle, Acceptance cone, Types of optical fibres, Applications of optical fibre, Comparison of optical fibre communication with electrical cable communication.	Simulation, Demonstration, Flipped Classroom, Collaborative Learning, Case Study, chalk and board etc.	CO5

		5.3 Laser: Definition, Properties of LASER, Spontaneous and Stimulated emission, Population inversion, Metastable state, Pumping, Lifetime, He-Ne laser construction and working with energy level diagram, Engineering applications of laser.		
UNIT – VI MODERN PHYSICS (CL Hrs-08, Marks-12)				
6	**TLO 6.1** Explain the production of X-rays. Describe the properties and applications of X-rays in different fields. **TLO 6.2** Describe properties of photon. Derive Einstein's photoelectric equation. Explain the working of a given photoelectric device.	**6.1 X-ray:** principle, production of X-rays using Coolidge tube, origin of X-rays, types of X-rays, properties of X-rays, engineering applications of X-rays, analytical treatment. **6.2 Photo electricity:** photoelectric effect, Plank's quantum theory, the concept of the photon, properties of the photon, threshold frequency, threshold wavelength, stopping potential, photoelectric work function, Einstein's photoelectric equation, photocell (circuit diagram and working), applications of photoelectric cell, analytical treatment.	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	LLO1.1 Use of given instrument and i) Mention name and range of the given instrument. ii) Calculate the least count of the given instrument. iii) List the uses of the given instrument.	Identify the given instrument and i) Mention the name and range of the given instrument. ii) Calculate the least count of the given instrument. iii) List the uses of the given instrument.	2	CO1
2	LLO2.1 Use a Vernier caliper to Measure the dimensions of given objects. Measure the dimensions of objects of known dimensions. LLO 2.2 Estimate the errors in measurement.	Measurements of dimensions of the given object by Vernier caliper.	2	CO 1
3	LLO3.1 Use a Micrometer Screw gauge to Measure the dimensions of given objects. Measure the dimensions of objects of known dimensions.	Measurements of dimensions of given objects by micrometre screw gauge.	2	CO1

	LLO 3.2 Estimate the measurement errors.			
4	LLO 4.1 Use a simple pendulum to determine acceleration due to gravity.	Determination of Acceleration due to Gravity by Simple Pendulum.	2	CO1
5	LLO5.1 Apply Ohm's law to solve circuit problems	Determination of resistance by Ohm's law.	2	CO2
6	LLO6.1 Determine the specific resistance of a given wire.	Determination of specific resistance of a given wire.	2	CO2
7	LLO7.1 Verify the law of the series connection of resistors /capacitors.	Determination of equivalent resistance in the series connection of resistors /capacitors.	2	CO2
8	LLO 8.1 Verify the law of the parallel connection of resistors /capacitors	Determination of equivalent resistance in parallel connection of resistors /capacitors.	2	CO2
9	LLO 9.1 Use meter bridge to: i) Determine the resistance of the given material of the wire. ii) Calculate the specific resistance of the given material of the wire.	Determination of i) resistance of given material of wire. ii) Calculate the specific resistance of the given material of wire by using a meter bridge.	2	CO3
10	LLO 10.1 Use a potentiometer to : i) Determine the potential gradient of the given cell (Principle of potentiometer). ii) Calibrate the given voltmeter	Calibrate the given voltmeter using a Potentiometer.	2	CO3
11	LLO 11.1 Use a potentiometer to : i) Compare the emf of two cells	Compare the emf of two cells using a Potentiometer.	2	CO3
12	LLO 12.1 Use a potentiometer to: i) Find the internal resistance of a cell.	Find the internal resistance of a cell by using a Potentiometer.	2	CO3
13	LLO 13.1 Use a magnetic compass to draw the magnetic lines of forces of magnets of different shapes and determine neutral points.	Determination of neutral points by magnetic compass.	2	CO4
14	LLO 14.1 Determine the refractive index of the glass slab using the Refraction phenomenon.	Determination of the refractive index of the glass slab.	2	CO5
15	LLO 15.1 Use of He-Ne laser beam.	Study the properties and working of the laser using a He-Ne laser beam.	2	CO5
16	LLO 16.1 Use photoelectric cells to study the effect of : i) Intensity of light on photoelectric current. ii) Applied potential on photoelectric current.	Study effect of i) Intensity of light on photoelectric current. ii) Applied potential on photoelectric current. using Photoelectric cell	2	CO6

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

Only one Micro Project is planned to be undertaken by a student assigned to him/her at the beginning of the semester. She/He ought to submit it by the end of the semester to develop industry-oriented COs. Each micro-project should encompass two or more COs. The Micro-Project could be industry application-based, internet-based, workshop-based, laboratory-based or field-based. The assessment of the micro-project is to be done under Practical (PA) Assessment. The Micro Project is preferably assigned to a group of (4-6) students or an individual taking into consideration the capabilities and circumstances at the time.

A suggested list is given here. A similar micro-project/ Assignment could be added by the concerned faculty.

Micro project:

- Series and parallel resistances: Prepare models for a combination of series and parallel resistances
- Series and parallel capacitors: Prepare models for a combination of series and parallel capacitors
- Magnetic flux: Prepare models to demonstrate magnetic lines of lines of forces
- Vernier Calipers: Prepare prototype vernier caliper of desired least count using card sheet
- Conductivity: Collect different materials such as metal, plastics, glass etc. and prepare models
- Carbon resistors: Determine the resistance and tolerance of carbon resistors using color codes
- Mobile applications: Use mobile applications for measurements of different physical quantities Optical Fiber and TIR: Prepare model to demonstrate total internal reflection
- Physical quantities: Prepare a Chart on comparison of systems of units for different physical quantities
- Magnetism: Prepare a chart on magnetic lines of force of bar magnet.
- LASER: Prepare a chart to study Total Internal Reflection/LASER.
- X-rays/Photoelectric cell. Prepare a chart showing the properties of X-rays/Photoelectric cells.
- Ohm's Law: Prepare Chart to Study Ohm's Law.

Assignment

- Convert the units of a given physical quantity from one system of units to another.
- Prepare a chart to summarize units and measurements.
- Give details about the explanation of concepts like electrostatics, and magnetic domain. Demonstrate the variation of the angle of refraction with respect to the refractive index.
- Use a digital vernier caliper and micrometer screw gauge for measurements. (lab-based).
- Applications of optical fibres in, engineering etc.
- Applications of X-ray in engineering etc.
- Applications of LASER in, engineering etc.
- Applications of Photoelectricity in, engineering etc

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Vernier Calliper : Range: 0-15 cm, Resolution 0.01 cm.	1
2	Micrometer screw gauge: Range 0-25 mm, Resolution 0.01 mm.	2
3	Simple pendulum, Stop Watch.	3
4	Glass Slab 75x50x12mm.	4
5	He-Ne laser kit	14
6	Battery eliminator (0-12 V, 2 A)	4,5,6,7,8,9
7	Voltmeter(0-10 V), ammeter (0-5 A)	1,4,5
8	Meter Bridge (100 cm), Galvanometer (30-0-30) and jockey.	8
9	Potentiometer (400 cm).	9,10,11
10	Potentiometer, Daniell cell, Leclanche cell.	9,10,11
11	Bar Magnet, Magnetic Needle.	12
12	Photoelectric cell.	15
13	Parallel/Series Resistance /Capacitor Kit	6,7

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	General Physics	CO1	7	2	4	4	10
2	II	Electrostatics	CO2	9	2	6	6	14
3	III	Current Electricity	CO3	9	4	4	6	14
4	IV	Magnetism	CO4	5	2	3	3	8
5	V	Optics and Laser	CO5	7	4	4	4	12
6	VI	Modern Physics	CO6	8	4	4	4	12
			Grand Total	**45**	**18**	**25**	**27**	**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	3	1		2	1	1	1			
CO2	3	1	1	2	1	1	1			
CO3	3	1	1	2	1	1	1			
CO4	3	1	1	1	1	1	1			
CO5	3	1	1	2	1	1	1			
CO6	3	1	1	2	1	1	1			

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	Narlikar J. V. ;Joshi , A. W.; Mathur , Anuradha ; et al	Physics Textbook Part I - Class XI	National Council of Education Research and Training, New Delhi, 2010, ISBN: 8174505083
2	Narlikar, J.V.;Joshi , A. W.; Mathur , Anuradha ; et al	Physics Textbook Part II - Class XI	National Council of Education Research and Training, New Delhi, 2015, ISBN: 8174505660
3	Narlikar J.V.;Joshi , A. W.; Ghatak A.K. et al	Physics Textbook Part I - Class XII	National Council of Education Research and Training, New Delhi, 2013, ISBN: 8174506314
4	Narlikar, J.V.;Joshi , A. W.; Ghatak A.K. et al	Physics Textbook Part II - Class XII	National Council of Education Research and Training, New Delhi, 2013, ISBN: 8174506713
5	Haliday, David; Resnik, Robert and Walker, Jearl	Fundamentals of Physics	John Wiley & Sons, Hoboken, USA, 2014 ISBN: 812650823X
6	Dr. Hussain Jeevakhan	Applied Physics - II	Khanna Book Publishing, (2021), ISBN: 978-93-91505-57-8

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	www.sciencejoywagon.com/physicszone	Electricity, Magnetism and Semiconductors, basic fiber optics
2.	https://phet.colorado.edu	Electricity, Magnetism and Semiconductors, Thermometry and basic fiber optics
3.	www.physicsclassroom.com	Concepts of basic physics

Sr.No	Link/Portal	Description
4.	http://nptel.ac.in/course.php?disciplineId=104	Concepts of basic physics
5.	http://hperphysics.phy-astr.gsu.edu/hbase/hph.html	Concepts of basic physics
6.	https://www.youtube.com/results?search_query=amruta+university+physics+expts	Concepts of basic physics
7.	k. https://www.youtube.com/results?search_query=physics+class+11+chapter+1	Concepts of basic physics
8.	l. https://www.youtube.com/watch?v=zRGh9_a1J7s	Concepts of basic physics
9.	https://iksindia.org	IKS physics
10.	https://www.ancient-origins.net/history-famous-people/indian-sageacharya-kanad-001399	IKS Philosophy of atom by Acharya Kanad.

Name & Signature:

Smt. D.V. Saurkar
Lecturer in Physics

Mr. N.S. Salave
Lecturer in Physics

Mr A.D. Ghorpade
Lecturer in Physics

(Course Experts)

Name & Signature:

Dr. D.N. Rewadkar
(Programme Head)

Name & Signature:

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

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMAIN CM/IT
PROGRAMME CODE	06/07
COURSE TITLE	BASIC MATHEMATICS
COURSE CODE	SC11206
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Assessment Scheme										
			Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TSL				Based on SL		Total Marks
														Practical						
			CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
										Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
SC11206	BASIC MATHEMATICS	AEC	4	2	-	2	8	4	3	30	70	100	40	-	-	-	-	25	10	125

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)

Studentswillbeabletoachieve&demonstratethefollowing CO'soncompletionofcourse-basedlearning

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. 1.3Matrices: 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 (Indian Mathematics).	Improved Lecture Tutorial Assignment Demonstration Simulation	CO1

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Sr. No.	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
	UNIT-II TRIGONOMETRY (CL Hrs-16, Marks-14)			
2	TLO 2.1: Apply the concept of Compound angle, allied angle, and multiple angles to solve the given simple engineering problem(s). TLO 2.2: Apply the concept of Sub-multiple angle to solve the given simple engineering-related problem(s). TLO 2.3: Apply the concept of factorization and de-factorization formulae to solve the given simple engineering problem(s). TLO 2.4: Investigate given simple problems by utilizing inverse trigonometric ratios. TLO 2.5: Use concepts given in Ancient Indian Mathematics for trigonometry to solve given problems.	2.1 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), and submultiples angles (without proof). 2.2 Factorization and De factorization formulae (without proof). 2.3 Inverse Trigonometric Ratios and related problems. 2.4 Principal values and the relation between trigonometric and inverse trigonometric ratios. 2.5 Trigonometry in Indian Knowledge System: The Evolution of Sine Function in India. 2.6 Indian Trigonometry: Basic Indian Trigonometry - Introduction and Terminology (From Ancient Beginnings to Nilakantha). 2.7 Trigonometry in Indian Knowledge System: Pythagorean triples in Sulabasutras.	Improved Lecture Tutorial Assignment Demonstration Simulation	CO2
	UNIT-III STRAIGHT LINE (CL Hrs-06, Marks-08)			
3	TLO 3.1 Calculate the angle between given two straight lines. TLO 3.2 Formulate equation of straight lines related to given engineering problems. TLO 3.3 Identify the perpendicular distance from the given point to the line. TLO 3.4 Calculate theperpendicular distance between the given two parallel lines. TLO 3.5 Use geometry given in Sulabasutras to solve the given problems.	3.1 Straight line and slope of a straight line: The angle between two lines Condition of parallel and perpendicular lines 3.2 Various forms of straight lines: a. General form b. Slope-point form c. Slope-intercept form d. Two-point form e. Double intercept form 3.3 Perpendicular distance from a point on the line 3.4 Perpendicular distance between two parallel lines 3.5 Geometry in Sulabasutras in Indian Knowledge System: a. Construction of square b. Circling the square	Improved Lecture Tutorial Assignment Demonstration Simulation	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

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

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

Micro-project

- **Matrix Inversion Function**: Create a function that takes a matrix as input and returns its inverse matrix if it exists. You can implement this using various programming languages like Python, and libraries like NumPy can be helpful.
- **Variance and Coefficient of Variance Calculation**: Collect data on marks obtained by your class in a mid-term test. Compute the variance and coefficient of variance of the data. Interpret the results using free open-source software like Orange, which is a data visualization and analysis tool.
- **Cryptography Using Matrices**: Prepare models using matrices to solve simple problems based on cryptography. You can explore techniques like matrix multiplication for encryption and decryption.
- **Data Analysis Models**: Collect data on quality control analysis, energy efficiency assessment, environmental monitoring, and process optimization. Analyze the data, calculate variance and standard deviation, and create a presentation, including short videos, to present your findings.
- **Geometric Models**: Prepare models using the concept of tangent and normal bending of roads in case of sliding of a vehicle. Express these geometric models using any open-source software suitable for geometry visualization.
- **Radius of Curvature in Railway Tracks**: Create models using the concept of the radius of curvature in

railway track design. Express these models geometrically through any open-source software suitable for geometry visualization.

- **Maxima and Minima Model**: Design a model for a window in the form of a rectangle surmounted by a semicircular opening. Optimize the total perimeter of the window to admit maximum light through the whole opening using the concept of maxima and minima. Verify the result mathematically.
- **Trigonometric Waveform Visualization**: Visualize trigonometric waveforms and create animations using sine or cosine functions. Use software or programming languages like Python with libraries such as Matplotlib to create these visualizations.
- **Trigonometric Function Calculator**: Develop a program for a trigonometric function calculator that computes sine, cosine, and tangent values. This can be implemented as a simple command-line tool or a graphical calculator application.
- **Applications of Radius of Curvature**: Collect and present applications of the radius of curvature in various fields such as lens design, optics, mirror properties, road design, structural analysis, roller coaster track design, and composite material manufacturing in a 5-minute video presentation.
- **Engineering Problems with Trigonometry**: Prepare models using trigonometry based on at least 10 engineering problems. Apply trigonometric principles to calculate angles, distances, forces, and dimensions relevant to the chosen area and create a poster presentation.
- **Determinant-Based Area Calculation**: Create charts and use determinants to find the area of regular shapes. You can use software like MATLAB, Python, or even manual calculations.
- **Matrix-Based Math Game**: Design a puzzle and create a math game based on matrix operations. Develop a grid of numbers and operations for players to solve using matrix manipulation rules.
- **Musical Composition with Matrices**: Use matrices as a tool for music composition. Assign different musical elements (notes, chords, rhythms) to matrix elements and experiment with combining and transforming matrices to create unique musical compositions. You can use music notation software or traditional instruments to bring your compositions to life.

Assignment

- Collect examples based on real-world applications of logarithms and prepare a PDF file.
- Solve the simultaneous system of equations in two variables by Matrix Inversion Method. Write down a mathematical program using any open-source software to verify the result.
- Collect examples of coding theory using applications of matrices and prepare a PDF file.
- Represent the Graph of the Trigonometric function and logarithmic function on Geogebra and interpret the nature of the graph. Make a PDF file.
- Measure the height of trees in surrounding locations using trigonometry and prepare a presentation.
- Find the derivative of y = x^sinx and visualize the graph of the function and its derivative using any open-source software geometrically.
- Find the height of the room or distance between two pillars by using the concept of a straight line.
- Collect at least 10 examples based on real-world applications of standard deviation/variance.
- Collect at least 10 examples based on real-world uses of applications of derivatives.

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	Differential Calculus	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 2. Rubrics for COs 3. Assignment 4. Self-Learning	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	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

Sr. No	Author	Title	Publisher
2	Dutta D.	A textbook of Engineering Mathematics	New Age publication New Delhi,2006 ISBN: 978-81-224-1689-3
3	Kreysizg, Ervin	Advance Engineering Mathematics	Wiley publication New Delhi 2016 ISBN 978-81-265-5423-2
4	Das H. K.	Advance Engineering Mathematics	S C hand publication New Delhi 2008 ISBN: 9788121993455
5	Marvin L. Bittinger David J. Ellenbogen Scott A. Surgent	Calculus and Its Applications	Addison-Wesley 10th Edition ISBN-13 978-0-321-69433-1
6	C. S. Seshadri	Studies in the History of Indian Mathematics	Hindustan Book Agency, New Delhi110016. ISBN978-93-80250-06-9
7	George Gheverghese Joseph	Indian Mathematics Engaging with the World from Ancientto ModernTimes	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;1stedition (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.	SpreadsheetApplications	Use of Microsoft Excel, Apple Numbers and Google Sheets.

Sr. No	Link/Portal	Description
5.	https://ocw.mit.edu/	MIT Courseware
6.	https://www.khanacademy.org/math?gclid=CNqIIualbCys4CFdOJaddIIoPig	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:
Dr. D. N. Rewadkar (Programme Head)	**Shri. S. B. Kulkarni** (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CM/IT
PROGRAMME CODE	06/07
COURSE TITLE	ENGINEERING WORKSHOP PRACTICE
COURSE CODE	WS21205
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Assessment Scheme											
			Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL &TSL				Based on SL		Total Marks
														Practical						
			CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
										Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
WS21205	ENGINEERING WORKSHOP PRACTICE	SEC	-	-	4	-	4	2	-	-	-	-	-	50	20	50@	20	-	-	100

Total IKS Hrs for Term: 0Hrs

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:

A diploma engineer in his/her professional life works in a typical business environment where s/he interacts with computers, peripherals and related devices and instruments. They must be able to use and maintain these equipment authentically. Diploma pass out must be able to use and maintain these system peripherals authentically. They must also possess basic skills in assembling desktop computers, interfacing with peripheral devices, installing new devices and carrying out basic preventive and breakdown maintenance. Hence, this course is designed to develop these vital skills through various workshop-based activities.

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: Carryout elementary-level maintenance of a PC.
CO2: Create partitions and format hard disk drives.
CO3: Install and configure the Operating system.
CO4: Configure different types of peripheral devices.
CO5: Setup a small Local Area Network.
CO6: Use diagnostic software for fault finding in Computer systems.

IV. THEORYLEARNINGOUTCOMESANDALIGNEDCOURSECONTENT

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
Theoretical Inputs related to Practical skill be provided during practical Hrs.				

V. LABORATORY LEARNING OUT COME AND ALIGNED PRACTICAL/TUTORIAL EXPERIENCES.

Sr. No	Practical/Tutorial/Laboratory Learning Outcome(LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
1	LLO1.1 Identify desktop/laptop by its type and verify its specifications LLO 1.2 Identify the type of server and verify its Specification	Lab Exp:1 Desktop/laptop/server type identification and its specification	2	CO1
2	LLO 2.1 Open PC Panel and Identify Components LLO 2.2 Clean inside PC - Boards and Slots	Lab Exp:2 Identification and cleaning of Components	4	CO1
3	LLO 3.1 Undertake Preventive Maintenance of PC using a vacuum cleaner and simple tools	Lab Exp:3 Preventive Maintenance of PC	2	CO1
4	LLO 4.1 Connect/disconnect the power socket and controller socket to disk drives and motherboard.	Lab Exp:4 Perform Internal socket connections	2	CO1
5	LLO 5.1 Configure different BIOS settings in the computer system	Lab Exp:5 Perform BIOS settings	2	CO1
6	LLO 6.1 Partition and manage hard disk LLO 6.2 Format hard drives with different file systems.	Lab Exp:6 Manage a Hard disk,	2	CO2
7	LLO 7.1 Install Operating System – Windows family (such as Windows 10, 11)	Lab Exp:7 Installation of Windows Operating System	2	CO3
8	LLO 8.1 Install Operating System – Unix family (such as Linux/Ubuntu/Centos)	Lab Exp:8 Installation of Unix family Operating System	2	CO3
9	LLO 9.1 Clean peripheral devices and connect them to the computer	Lab Exp:9 Peripheral devices cleaning	4	CO4

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
10	LLO 10.1 Install local printer by applying various types of configuration settings. LLO 10.2 Remove and mount cartridge, troubleshoot paper jam	Lab Exp:10 Installation of local and Network printer	2	CO4
11	LLO 11.1 Share the printer, devices, and folders on a network.	Lab Exp:11 Share devices, files and folders	4	CO4
12	LLO 12.1 Install and configure scanner	Lab Exp:12 Installation of the scanner	2	CO4
13	LLO 13.1 Set and configure monitor/display, Speaker, Microphone and LCD Projector	Lab Exp:13 Set Input/output devices	2	CO4
14	LLO 14.1 Prepare and test crossover and straight cable, CAT5, CAT6 Cable, using connector, crimping tools, splicer	Lab Exp:14 Make CAT5, CAT6 Cable	2	CO5
15	LLO 15.1 Connect/disconnect LAN Cable, External Hard disk, Modem, LCD/DLP Projector	Lab Exp:15 Connect devices to external port	2	CO5
16	LLO 16.1 Connect Modem, Hub/Switches/routers and verify the connection	Lab Exp:16 Networking devices connection	2	CO5
17	LLO 17.1 Check different types of fibre optic cable construction and connectivity	Lab Exp:17 Fiber optic cable construction	2	CO5
18	LLO 18.1 Connect two Switches/Hubs using normal and uplink port	Lab Exp:18 Connection of Switches/Hubs	2	CO5
19	LLO 19.1 Configure devices to setup Wi-Fi environment	Lab Exp:19 Setup Wi-Fi environment	2	CO5
20	LLO 20.1 Create a small wired network environment	Lab Exp:20 Setup wired network environment	4	CO5
21	LLO 21.1 Set and configure Bluetooth-based wireless mouse, keyboard and other devices	Lab Exp:21 Setup wireless I/O devices	2	CO5
22	LLO 22.1 Use diagnostic software for PC fault finding	Lab Exp:22 Fault diagnostics	4	CO6
23	LLO 23.1 Install Antivirus and Configure various settings	Lab Exp:23 Anti-viruses installation	2	CO6
24	LLO 24.1 Replace internal components of PC	Lab Exp:24 Component replacement	4	CO6

VI. SUGGESTED MICROPROJECT/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	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	1,2,3,4,5,6,7,8,9,10,11,12,13,14, 15,16,17,18,19,20,21,22
2	LCD/DLP Projector(Epson EB-X49 XGA Projector Brightness: 3600lm with HDMI Port (Optional Wi-Fi).	15
3	Modems, hubs, switches, Router	16
4	Wi-Fi set-up with access point and repeater	19
5	Bluetooth-based wireless mouse and keyboard or any other device	21
6	Cat5/Cat6 cable, with RJ 45 Connectors, LAN tester	14
7	Fiber optic cable with SC, ST, and LC Connectors	17
8	Laser Printer	10,11
9	Scanner	12
10	Hub/Switches/Routers	18
11	Fault-finding software, antivirus	22,23
12	Operating System, Hard Disk	6,8
13	Computer Maintenance kit	2,3,4,5,6,7,8,9,10,11,12,13,14, 15,16,17,18,19,20,21,22
14	External Hard Disk(500 GB/1 TB)	15
15	Light vacuum cleaner, approx. 200 watts with brushes and	2,3,9

VIII.SUGGESTED FORWEIGHTAGETO LEARNING EFFORTS&ASSESSMENTPURPOSE(Specification Table)

NOT APPLICABLE

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
Rubrics for COs , Terms work, Presentation	End of Term Examination (Lab. performance), Viva-voce

X. SUGGESTED COs- POsMATRIXFORM

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	-	3	-	-	-	3	-	1
CO2	1	-	-	2	-	-	-	3	-	1
CO3	1	-	-	2	-	-	1	3	-	1
CO4	-	-	-	2	-	-	1	3	-	1
CO5	1	1	1	2	-	-	-	3	-	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	James, K.L.	The computer hardware installation, interfacing, troubleshooting and maintenance	PHI Learning, New Delhi, 2014 ISBN: 978-81-203-4798-4
2	Minasi, Mark	The Complete PC Upgrade And maintenance Guide	BPB Publication, New Delhi ISBN:978-81-265-0627-9
3	Kadam, Sachin	Computer Architecture and Maintenance Vol.I	Shroff Publication, Mumbai ISBN: 978-9350230244
4	Craig Zacker, John Rourke	The Complete Reference PC Hardware	McGraw Hill Education ISBN-13:978-0070436060

XII. LEARNING WEBSITES & PORTALS

Sr. No	Link/Portal	Description
1.	http://www.ciscopress.com/articles/article.asp?p=2086239&seqNum=4 Essential Introduction to Computer	Reading material about computer Lab Procedures and tool use
2.	http://www.instructables.com/id/Computer-Assembly/	Reading material about Computer assembly

3.	http://www.liutilities.com/how-to/operate-a-laptop-computer/	Article about How To Operate a Laptop Computer
4.	https://video.search.yahoo.com/search/video?fr=mcafee&ei=UTF-8&p=hardware+maintenance+and+troublesho	Video about Troubleshooting of Computer
5.	geeksforgeeks.org/how-to-set-up-a-LAN-network	Reading material about the process of settingup a LAN
6.	https://www.youtube.com/watch?v=ec2fyg-B5WE	Video about setting a LAN

Name & Signature:

Mrs. Sheetal J. Siraskar
Lecturer in Computer Engineering

Mrs. Priya K. Zade
Lecturer in Computer Engineering

(Course Experts)

Name & Signature:	Name & Signature:
Dr. D.N. Rewadkar (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	Assessment Scheme											
			Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TSL				Based on SL		Total Marks
														Practical						
			CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
										Max		Max	Min	Max	Min	Max	Min	Max	Min	
CM21201	FUNDAMENTALS OF ICT	SEC	1	-	2	1	4	2	--	--	--	--	--	25	10	25/@	10	25	10	75

Total IKS Hrs for Term: 0 Hrs

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

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

Note:

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

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.	**TLO 1.1** Explain the functions of components in the block diagram of the computer system. **TLO 1.2** Classify the given type of software. **TLO 1.3** Explain the characteristics of the given type of network. **TLO 1.4** Describe the application of the given type of network connecting device. **TLO 1.5** Describe the procedure to manage a file /folder in the given way.	**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. **1.2 Internal components:** processor, motherboards, random access memory (RAM), read-only memory (ROM), video cards, sound cards and internal hard disk drives). **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. **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. **1.5 Network environments:** network interface cards, hubs, switches, routers and modems, the concept of LAN, MAN, WAN, WLAN, Wi-Fi and Bluetooth. **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.	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	**TLO 2.1** Write the steps to create the given text document. **TLO 2.2** Explain the given feature for document editing. **TLO 2.3** Explain the given page setup features of a document. **TLO 2.4** Write the given table formatting feature. **TLO 2.5** Write the steps to set the given type of document layout	**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. **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. **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. **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. **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. **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.	Hands-on Demonstration Presentations	CO2
		UNIT-III SPREADSHEETS (CL Hrs-03, Marks-NIL)		
3	**TLO 3.1** Write the steps to create the given spreadsheet. **TLO 3.2** Explain the given formatting feature of a worksheet. **TLO 3.3** Write steps to insert formulas and functions in the given worksheet. **TLO 3.4** Write steps to create charts for the	**3.1 Working with Spreadsheets:** Overview of workbook and worksheet, Create Worksheet Entering sample data, Save, Copy Worksheet, Delete Worksheet, Close and open Workbook. **3.2 Editing Worksheet:** Insert and select data, adjust row height and column width, delete, move data, insert rows and columns, Copy and Paste, Find and Replace, Spell Check, Zoom In-Out, Special Symbols, Insert Comments, Add Text Box, Undo Changes, - Freeze **3.3 Formatting Cells and sheet:** Setting Cell Type, Setting Fonts, Text options, rotating cells,-Setting Colors, Text Alignments, Merge and Wrap, applying	Hands-on Demonstration Presentations	CO3

	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.	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.		
UNIT- IV PRESENTATION TOOL (CL Hrs-04, Marks-NIL)				
4	**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.	**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.	Hands-on Demonstration Presentations	**CO4**

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT –V BASICS OF INTERNET AND EMERGING TECHNOLOGIES (CL Hrs-04, Marks-NIL)				
5	**TLO 5.1** Explain the use of the given setting option in browsers. **TLO 5.2** Explain the given option used for effective searching in search engine **TLO 5.3** Explain the features of the given web service. **TLO 5.4** Explain concepts and applications of emerging technologies **TLO 5.5** Use various elementary cloud-based tools	**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. **5.2 Web Services:** e-Mail, Chat, Video Conferencing, e-learning, e-shopping, e-Reservation, e-Groups, Social Networking. **5.3 Emerging Technologies:** IoT, AI and ML, Drone Technologies,3D Printing. **5.4 Tools:** Docs, Drive, forms, quiz, Translate and other Apps.	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	LLO 1.1 Identify various Input/output devices, connections and peripherals of the computer system. LLO 1.2 Work with Computer systems, Input/output devices, and peripherals to manage files and folders for data storage.	a) Work with Computer Systems, Input/output devices, and peripherals. b) Work with files and folders	2	CO1
2	LLO 2.1 Create and manage Word document. LLO 2.2 Apply formatting features on text at line, paragraph and page level.	Work with document files: a) Create, edit and save documents in Word Processing. b) Text, lines and paragraph-level formatting	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	LLO 5.1 Apply page layout features in word processing. LLO 5.2 Print a document by applying various print options LLO 5.3 Use mail merge in word processing	Working with layout and printing a) Document page layout, Themes, and printing. b) Use of mail merge with options.	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	PSO-3
CO1	1	-	-	-	-	-	1	2	-	-
CO2	-	-	-	3	-	-	1	-	-	1
CO3	-	2	1	3	-	-	1	-	3	1
CO4	-	-	-	3	-	-	1	-	-	1
CO5	1	-	-	3	-	-	3	2	-	1

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

XI. SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No	Author	Title	Publisher
1	Goel, Anita	Computer Fundamentals	Pearson Education, New Delhi, 2014. ISBN-13: 978-8131733097
2	Miller, Michael	Computer Basics Absolute Beginner's Guide, Windows 10	QUE Publishing; 8th edition August 2015. ISBN: 978-0789754516
3	Alvaro, Felix	Linux: Easy Linux for Beginners	CreateSpace Independent Publishing Platform- 2016, ISBN-13: 978-153368373
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:	Name & Signature:
Dr. D.N. Rewadkar (Programme Head)	**Shri. S.B. Kulkarni** (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CM / IT
PROGRAMME CODE	06/07
COURSE TITLE	Linux Basics
COURSE CODE	CM21202
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Assessment Scheme											
			Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TSL				Based on SL		Total Marks
														Practical						
			CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
										Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
CM21202	Linux BASICS	DSC	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,@S - Internal Online Examination

Note:

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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:

Linux Operating System is Open source and freely distributed Operating System (O.S). Apart from the fact that it's freely distributed, Linux's functionality, adaptability and robustness make it highly suitable for the server platform. The course aims at providing knowledge of shell and command line essentials.

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: Install and Configure Linux O.S.
CO2: Execute various commands of the Linux Operating System.
CO3: Manage files and Directories in Linux OS
CO4: Compress and archive files in Linux OS.
CO5: Write and execute programs using shell scripting.

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 LINUX OPERATING SYSTEM (CL Hrs-02, Marks-NIL)			
1.	**TLO1.1:** Describe the History of Linux. **TLO1.2:** Identify different types of shells. **TLO1.3:** Compare Linux file systems.	**1.1.** Operating System and Linux **1.2.** History, Overview of Linux **1.3.** Shell: Bourne, Korn, Cshell. **1.4.** Linux releases, Linux File Systems (ext) and versions.	Class Room Teaching, Presentations	**CO1**
	UNIT-II THE SHELL (CL Hrs-04, Marks-NIL)			
2	**TLO2.1:** Use the History command. **TLO2.2:** Use filename arguments. **TLO2.3:** Execute file-related Commands. **TLO2.4:** Execute commands using pipes and I/O redirection.	**2.1** The Command Line. **2.2** Command Line Editing. **2.3** Command and Filename Completion. **2.4** History: History Events, History command, History Event Editing. **2.5** Configuring History: HISTFILE and HISTSAVE. **2.6** Filename Expansion: *, ?, [ ]: Matching Multiple Characters, Matching Single Characters, Matching a Range of Characters, Matching Shell Symbols, Generating Patterns. **2.7** Standard Input/Output and Redirection: Redirecting the Standard Output: > and >>, The Standard Input. **2.8** Pipes: |, Redirecting the Standard Error:2>, >>.	Demonstration, Presentations	**CO2**
	UNIT-III LINUX FILES AND DIRECTORIES (CL Hrs-02, Marks-NIL)			
3	**TLO3.1:** Describe Linux file structure. **TLO3.2:** Use absolute and relative pathnames. **TLO3.3:** Execute file and Directory commands. **TLO3.4:** Change file and directory permissions. **TLO3.5:** Use the link command.	**3.1** Linux Files, The File Structure-Home Directories, Pathnames, System Directories. **3.2** Listing, Displaying, and Printing Files(ls, cat, more, less, and lpr). **3.3** Displaying Files: cat, less, and more, Printing Files: lpr, lpq and lprm. **3.4** Managing Directories (mkdir, rmdir, ls, cd, and pwd): Creating and Deleting Directories, Displaying Directory Contents, Moving Through Directories, and Referencing the Parent Directory.	Demonstration, Presentations	**CO3**

		3.5 File and Directory Operations (find, cp, mv, rm, and ln): Searching Directories: find, Searching the Working Directory, Locating Directories, Copying Files, Moving Files, Copying and Moving Directories, Erasing Files and Directories: The rm Command. **3.6** Links: The ln Command, Symbolic Links, Hard Links. **3.7** File and Directory Permissions: chmod.		
UNIT- IV ARCHIVE, EDITORS AND UTILITIES (CL Hrs-03, Marks-NIL)				
4	**TLO4.1:** Compress and archive files. **TLO4.2:** Create and modify files using the vi editor. **TLO4.3:** Use the line editing command.	**4.1** Archive Files and Devices: tar Displaying Archive Contents, Creating Archives, Extracting Archives, Updating Archives and Compressing Archives. **4.2** File Compression: (gzip, bzip2, and zip) Compression with gzip, Compressing with bzip2, Using Zip. **4.3** The vi Editor: vi Command, Input, and Line Editing Modes. **4.4** Creating, Saving and Quitting a File in vi, Managing Editing Modes in vi. **4.5** vi Editing Commands: Common Operations.	Demonstration, Presentations	**CO4**
UNIT –V FILTERS, REGULAR EXPRESSIONS AND SHELL PROGRAMMING (CL Hrs-04, Marks-NIL)				
5	**TLO5.1:** Execute Linux filters. **TLO5.2:** Execute commands using regular expressions. **TLO5.3:** Execute shell script programs.	**5.1** Filters and Regular Expressions: Using Redirection and Pipes with Filters: cat, tee, head and tail. **5.2** Types of Filter Output: wc, spell and sort. **5.3** Configuring Your Login Shell with Special Shell Variables. **5.4** Introduction to BASH Shell Programming, Variables and Scripts.	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	**LLO 1.1:**Installing Linux: Hardware, Software, Requirements, Opening Disk space for Linux partitions **LLO 1.2:** Virtual Consoles **LLO 1.3:** Configuring GRUB / LILO Boot Loader.	Installation of Linux Operating System	04	**CO1**
2	**LLO 2.1:** Executing commands related to Login into user accounts, start-up and shutdown commands. **LLO 2.2:** command line editing commands, man, who, who am i, info, pwd.	Execute Basic Linux commands.	02	**CO2**
3	**LLO 3.1:** Executing Commands, I/O redirection and pipes. **LLO 3.2:** Practicing File Name Arguments: *,?, [ ].	Execute I/O redirection and File Name Arguments commands.	02	**CO3**
4	**LLO 4.1:**Executing various file-related commands –cat, more,ls, cd, cp, mv, rm, touch, mkdir, rmdir, find.	Working with Linux file commands.	04	**CO3**
5	**LLO 5.1:**Practicing Absolute and Relative Pathnames. **LLO 5.2:** Setting/Changing file and directory-related permissions chmod. **LLO 5.3:**Execute Link command.	Working with Pathnames and files. Permissions	04	**CO3**
6	**LLO 6.1:**Executing commands related to archive and file compression	Execute archive and file compression commands.	02	**CO4**
7	**LLO7.1** Executing various commands related to vi Editor. **LLO 7.2:** Practicing editing with vi editor. **LLO 7.3:** Practicing vi editing commands.	Practice vi Editor commands.	04	**CO4**
8	**LLO 8.1:** Executing various Shell commands: cat, tee, head and tail. **LLO 8.2:** Creating shell variables	Practice Shell commands.	02	**CO5**
9	**LLO 9.1:** Configuring Login Shell with Special Shell Variables. **LLO 9.2:**Practicing filter output: wc, spell and sort.	Practice Login Shell and filter c ommands.	02	**CO5**
10	**LLO10.1:**BASHShell Programming (any 4 basic programs without looping)	Implement basic Shell programs.	04	**CO5**

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

Self-Learning

Following are some suggestive self_learning topics:

a) Use ChatGPT/any other AI tool to explore information.
b) Online courses/MOOCs/Spoken Tutorial etc.
c) Write a shell program for the following:
1. Take 1st name as input from the user. (E.g., John)
2. Take 2nd name as input from the user. (E.g., Smith)
3. Display both names individually.
4. Display the message "Welcome John and Smith."
5. Redirect this output to a file.
d) Write a Shell script to calculate the gross salary of the employee. (HRA = 20% of basic salary, DA = 50% of basic salary).
e) Write a shell program for the following:
1. Execute commands to add "Hello GPP" 5 times in a file in Vi editor.
2. Execute commands to sort a file in alphabetical order with a numbered list.
f) Write a shell program to display the contents of two files in sorted format with numbers on each line.
g) Write a program to find misspelled words from two files and write the output to a new file.

Micro project

Not Applicable

Assignment

Prepare a journal of practicals performed in the laboratory.

VII. LABO

VIII. RATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Computer system with all necessary components like; motherboard, random access memory (RAM), read-only memory (ROM), internal hard disk drives, Mouse, Keyboard, and open-source operating System. (RedHat, Ubuntu etc.).	ALL

IX. 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 the Linux Operating System	CO1	02	--	--	--	--
2	II	The Shell	CO2	04	--	--	--	--
3	III	Linux Files and Directories	CO3	02	--	--	--	--
4	IV	Archive, Editors and Utilities	CO4	03	--	--	--	--
5	V	Filters, Regular Expressions and Shell programming	CO5	04	--	--	--	--
		Grand Total		**15**	--	--	--	--

X. 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

XI. 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	3	1	-	3	3	-	3
CO2	3	-	1	3	1	-	3	3	1	3
CO3	3	-	1	3	1	-	3	3	1	3
CO4	3	2	2	3	1	-	3	3	1	3
CO5	3	2	2	3	1	-	3	3	1	3

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

XII. SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No	Title	Author	Publisher
1	Linux The Complete Reference	Richard Petersen	McGraw Hill,6thedition (16 January 2008)ISBN-10 007149247X
2	Linux command line and shell scripting	Richard Blum	Willey India, ISBN-10119700914
3	Linux Lab: Hands on Linux.	Prof. Dayanand Ambawade	DreamtechPress (14 September 2009)ISBN-10 935004000X

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link/Portal	Description
1.	https://maker.pro/linux/tutorial/basic-linux-commands-for-beginners	Linux Basic Commands
2.	https://www.guru99.com/must-know-linux-commands.html	Linux Basic Commands
3.	https://www.shellscript.sh/	Shell Scripts and Programs
4.	https://www.tutorialspoint.com/unix/shell_scripting.html	Shell Scripts and Programs examples
5.	https://spoken-tutorial.org/tutorial	Online Course

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(Course Experts)

Name & Signature:

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(Programme Head)

Name & Signature:

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

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

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

I. LEARNING & ASSESSMENT SCHEME

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

Total IKS Hrs for Term: 1Hr

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

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

Note:

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

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

II. RATIONALE:

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

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

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

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

CO1 - Practice basic Yoga and Pranayama in daily life to maintain physical and mental fitness.
CO2 - Practice meditation regularly to improve concentration and better handling of stress and anxiety.
CO3 - Follow a healthy diet and hygienic practices for maintaining good health.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

NOT APPLICABLE

V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL/TUTORIAL EXPERIENCES.

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
1	LLO 1.1 Practice warming up for Yoga.	Introduction:- Presentations on Introduction to Yoga and its History. Lab Exp: 1. Perform warming-up exercises to prepare the body from head to toe for Yoga.	5	CO1
2	LLO 2.1 Practice Surya Namaskar	Lab Exp: 2. Perform all the postures of Surya Namaskar one by one at a very slow pace, after warm-up. Lab Exp 3. Perform multiple Surya Namaskar (Starting with three and gradually increasing it to twelve) in one go. Experiments 2 to 4 must be followed by Shavasana for self-relaxation.	7	CO1, CO2
3	LLO 3.1 Practice basic Asanas	Lab Exp: 4 Perform Sarvangasna, Halasana, Kandharasana (setubandhasana) Lab Exp: 5 Perform Bhujangasana, Naukasana, Mandukasana Lab Exp: 6 Perform Paschimottasana, Baddhakonasana,Bharadwajasana. Lab Exp: 7 Perform Veera Bhadrasana, Vrukshasana, Trikonasana. Follow-up experiments 5 to 7 with Shavasana for self-relaxation	8	CO2
4	LLO 4.1 Practice basic Pranayama	Lab Exp: 8 Perform Bhastrika, Anulom Vilom Pranayam Kriya Lab Exp: 9 Practice Kapalbhati Pranayam Kriya Lab Exp: 10 Practice Bhramary Pranayam.	5	CO3

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
5	LLO 5.1 Practice Meditation	Lab Exp: 11 Perform sitting in Dhyan Mudra and meditating.Star 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

Outcomes

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.swa am2.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/previe w	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/previe w	Food Nutrition for Healthy Living

Name & Signature: Shri. Sunil P. Date (Course Experts)	
Name & Signature: Dr. D.N. Rewadkar (Programme Head)	Name & Signature: Shri. S.B. Kulkarni (CDC In-charge)