GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE
PROGRAMME CODE	01
COURSE TITLE	CONSTRUCTION TECHNOLOGY
COURSE CODE	CE31202
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	
CE31202	CONSTRUCTION TECHNOLOGY	DSC	3	0	4	1	8	4	3	30	70	100	40	25	10	-	-	25	10	150

Total IKS Hrs for Term: 1 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:

Construction is a core activity in Civil Engineering. Constructions can be categorized in to buildings, transportation, irrigation, infrastructure and environmental engineering. This programme has dedicated courses on transportation, irrigation and environmental engineering. This course focuses on construction aspects of buildings.

The course encompasses the components of buildings, their construction techniques and quality aspects. This course essentially imparts the knowledge of construction technology along with the processes involved in it. Overall, the course lays emphasis on training the student to emerge as an efficient supervisor of building work.

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

The theory, practical experiences and relevant soft skills associated with this course are planned with an intention to evolve following industry-oriented Course Outcomes associated with the above-mentioned competency:

CO1: Identify components of building structures.
CO2: Propose suitable type of foundation for building and supervise the construction of proposed foundation.
CO3: Select suitable type of masonry and supervise the construction along with temporary structures for proposed type of masonry.
CO4: Propose relevant means of communication and ventilation for different types of buildings.
CO5: Select the relevant finishing technique and material for finishing purpose in the given situation posed.

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, OVERVIEW OF BUILDING COMPONENTS (Hours: 05, Marks: 08)				
1.	TLO 1.1 Classify the given building on the basis of the given occupancy and type of construction. TLO 1.2: Categorize the Component parts of the given type of building. TLO 1.3: Explain the salient characteristics for the given building structure. TLO 1.4: Compare load bearing and framed structure.	1.1 Classification of Buildings- According to National Building Code Part III (2005) Group A to I Latest code may be referred. As per Type of Constructions- Load Bearing Structure, Framed Structure and Composite Structure, Precast construction. 1.2. Building Components: a. Building Components and their function. b. Substructure -Foundation, Plinth and Plinth Filling. c. superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Mezzanine floor, Roof, Columns, Beams, Parapet.	Chalk-Board, Model Demonstration ,Video Demonstrations, Case Study Presentations Site/Industry Visit	**CO1**
UNIT- II , CONSTRUCTION OF SUBSTRUCTURE (Hours: 10, Marks : 16)				
2.	TLO 2.1: Describe the procedure of line out of the given building. TLO 2.2 : Suggest the suitable type of foundation for the given structure with justification, for proposed building. TLO 2.3: Describe the necessity and method of construction of under reamed pile foundation. TLO 2.4: Suggest the relevant method of dewatering in given situation. TLO 2.5: Suggest remedial measures for settlement of foundation.	2.1 Job Layout: Site Clearance, Preparing Job Layout, Layout for Load Bearing Structure and Framed Structure by Centre Line and Face Line Method, Precautions. 2.2 Foundation: Definition, Purpose, Functions of foundation, Requirements of good foundation. 2.3 Types of Foundation: a.Shallow Foundation- Stepped Footing, Wall Footing, Isolated and combined column footing. Raft foundation, Grillage Foundation. b.Deep Foundation- Pile Foundation: Classification based on materials and functions. Underreamed pile foundation. c.Well foundation and Caissons. (only purpose) 2.4Dewatering - Methods of dewatering- Pumping, Deep wells, wellpoints. 2.5 Settlement of foundation: Causes and Remedial measures.	Chalk-Board, Model Demonstration ,Video Demonstrations, Case Study Presentations Site/Industry Visit	**CO2**

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT III- CONSTRUCTION OF SUPER STRUCTURE (Hours: 14, Marks: 20)				
3.	TLO 3.1: Supervise stone masonry construction. (Describe the major features of the given type of stone masonry construction.) TLO 3.2: Brick masonry construction. (Describe the salient features of given type of brick masonry construction.) TLO 3.3:Requirements of good stone and brick masonry. TLO 3.4: Describe the given types of brick masonry bonds with sketches. TLO 3.5: Suggest, emphasize and supervise hollow block / AAC block / composite masonry. TLO 3.6: Suggest suitable type of scaffolding. TLO 3.7:Advantages of steel scaffolding. TLO 3.8: Select suitable formwork TLO 3.9: Period of removal of form work with justification.	3.1 Stone Masonry: Technical Terms used in stone masonry-facing, backing, hearting, through stone, corner stone, cornice. Type of stone masonry-Rubble masonry. Ashlar Masonry and their types. Factors affecting the selection of type of Stone Masonry. Precautions to be observed in Stone masonry Constructions. (IKS-Ancient heritage building-stone masonry work) 3.2 Brick masonry: Technical Terms used in brick masonry-header, stretcher, closer, quoins, course, face, back, hearting, bat, bond, joints, lap, frogline, level and plumb. Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. Joints in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone masonry and Brick Masonry. Tools and plants required for construction of stone masonry and brick masonry. Hollow concrete block masonry and composite masonry. Autoclaved Aerated Concrete Block-Introduction only. 3.3 Scaffolding: Definition, Necessity, Component parts Types of Scaffolding, platforms used for multi storied building 3.4 Shoring: Purpose, Types of Shoring, Process of Erection and Dismantling. 3.5 Underpinning- definition, Purpose. 3.6 Formwork: Definition,requirements of good Formwork, Materials used in Formwork, Types of Formworks, Removal of formwork.	Chalk-Board, Model Demonstration ,Video Demonstrations, Case Study Presentations Site/Industry Visit	**CO3**
UNIT-IV BUILDING COMMUNICATION AND VENTILATION (Hours:10, Marks:16)				
4.	TLO 4.1 Describe the type of opening for the given situation with sketches. TLO 4.2 Suggest the relevant types of doors and windows and lintels for the given situation with justification. TLO 4.3 Select the type of fixture and fastener to be used for given type of door or window with justification.	4.1. Horizontal Communication: Doors– Definition, Purpose, Components of Doors. Types - Fully Paneled Doors, Partly Paneled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, Revolving Doors, Glazed Doors, Sizes of Door- recommended by BIS. 4.2. Windows- Definition, Purpose, Component of windows. Types of Windows-Fully Paneled, Partly Paneled and Glazed, wooden, Steel, Aluminum windows, Sliding Windows, Louvered Window, Bay window, Corner window, clear-story window, Gable and Dormer window. Skylight window.	Chalk-Board, Model Demonstration ,Video Demonstrations, Case Study Presentations Site/Industry Visit	**CO4**

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
4.	TLO 4.4 Suggest the relevant type of vertical means of communication for the given situation. TLO 4.5Suggest the type of staircase for the given situation.	Sizes of Windows recommended by BIS. ventilators, Cement Grills. 4.3. Lintels – Definition, Purpose. Types- According to Material. Functions of Window Sill, Weather Shed/chajja. 4.4. Vertical Communication: Means of vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Technical Terms used in Staircase-step, tread, riser, nosing, soffit, waist slab, baluster, balustrade, going, Scotia, hand rails, newel post, landing, headroom, winder. Types of Staircase-According to Geometry: Straight, dog-legged, open well, Spiral, Quarter turn, Bifurcated, three quarter turn, and Half turn. Calculation of no of flight's, dimensions of rise and trade.	Chalk-Board, Model Demonstration ,Video Demonstrations, Case Study Presentations Site/Industry Visit	**CO4**
UNIT -V BUILDING FINISHES (Hours:06, Marks:10)				
5.	TLO 5.1Select/Choose the flooring material for the given type of building with justification. TLO 5.2 Explain the procedure for laying and construction of given type of floor. TLO 5.3 Describe the procedure of Plastering and pointing for the given type of construction. 5d. Select the relevant type of paint materials to be used for the given type of building surface. TLO 5.4 Select suitable type of Facade for given type of building.	5.1 Floors: Types of Floor Finishes and its suitability- Shahabad, Kota, Marble, Granite, Kadappa, Ceramic Tiles, Vitrified, Chequerred Tiles, Pavement Blocks, Concrete Floors, wooden flooring. Skirting and Dado. 5.2. Roof: flat roof, Pitched Roof- King Post truss, Queen Post Truss and Lean to Roof, Terms used in pitched roofs. Roofing Materials-RCC, Mangalore Tiles, AC Sheets, G.I. Sheets, Painted Corrugated G.I. Sheets, Plastic and Fiber Sheets. 5.3. Wall Finishes: Plastering – Definition, Necessity. Procedure of Plastering, Single coat plaster, Double coat Plaster, Rough finish, neeru Finishing and POP.Special Plasters- Stucco Plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings. Precautions to be taken while Plastering. Defects in Plaster. Pointing - Necessity. Types of pointing. Painting -Necessity, Surface Preparation for painting. Type of paint-white wash, distemper, oil bond, cement paint, oil paint, method of application. Selecting Suitable Painting Material. 5.4 Facade Engineering: Different materials used in Facade, Application, Merits and Demerits of Facade.	Chalk-Board, Model Demonstration ,Video Demonstrations, Case Study Presentations Site/Industry Visit	**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	LLO1.1: Identification of building components of existing building / model.	*Identify building components and emphasize their provision by holding a planned inspection of existing building / model.	2	1
2	LLO2.1: layout marking of load bearing building	*Prepare foundation plan to mark layout on the ground of load bearing building from the given building plan.	4	2
3	LLO3.1: layout marking of framed structure building	Prepare foundation plan to mark layout on the ground of framed structure building from the given building plan.	4	2
4	LLO 4.1: Assemble one and half Brick thick wall in given bond.	*Assemble one and half Brick thick wall in English Bond (minimum 3 Course) and prepare a report on it with pictures/photos.	4	3
5	LLO 5.1: Assemble one and half Brick thick wall in given bond.	Assemble one and half Brick thick wall in a Flemish Bond. (minimum 3 Course) and prepare a report on it with sketches/photos.	4	3
6	LLO 6.1 Identification of tools.	Observe and identify the tools used for brick and stone masonry construction on site, and prepare the report of same.	2	3
7	LLO 7.1 Assemble Stone/ Autoclaved Aerated Concrete Blocks to prepare wall.	Prepare a simple stone masonry construction work. OR prepare a visit report with sketches / photos by arranging visit to stone masonry/Autoclaved Aerated Concrete Block Masonry construction.	4	3
8	LLO 8.1 Identification of type of Scaffolding, formwork and centering work used at site.	*Prepare a visit report with sketches/photos of construction site with respect to scaffolding, formwork and centering work.	4	3
9	LLO 9.1 Identify the staircase in the given Model / Existing Building.	*Identify various components of the Existing / Model of staircase and take measurements of its various components to prepare the report with labelled sketches.	4	4
10	LLO 10.1 Identify the Doors and Windows in the given Model / Existing Building.	*Identify various components of the Existing Building / Model of Doors and Windows and take measurements of its various components to prepare the report with labelled sketches.	4	4
11	LLO 11.1 Identify the various fixtures and fastenings for Doors and Windows.	Identify and draw the various fixtures and fastenings used for Doors and Windows in the Existing Building.	4	4
12	LLO 12.1 Checking verticality of door frame using Plumb Bob.	*Checking verticality of door frame using Plumb Bob for the given Door frame.	2	4

13	LLO 13.1 Prepare a site visit report with reference to different types of flooring materials.	*Prepare report with labelled sketches of inspected flooring materials during site visit.	4	5
14	LLO 14.1 Prepare a site visit report with reference to different types of roofing materials.	*Prepare report with labelled sketches of inspected roofing materials during site visit.	4	5
15	LLO 15.1 Prepare a site visit report with reference to process of plastering and pointing.	Prepare a visit report with sketches/photos by observing the process of plastering and pointing of a masonry work at construction site.	4	5
16	LLO 16.1 Prepare a site visit report with reference to process of Painting.	Prepare a visit report with sketches/photos by observing keenly the process of painting in residential / public building.	4	5
17	LLO 17.1 Carry out market survey for identifying various finishing materials.	Carry out market survey of the building materials used for Flooring available in your city & prepare a report	4	5
18	LLO 18.1 Carry out market survey for identifying various painting materials.	Carry out market survey for identifying various Painting materials available in your city and prepare a report.	4	5
19	LLO 19.1 Prepare a site visit report with reference to Façade.	Prepare a visit report with sketches/photos by observing keenly the process of Facade in residential / public building.	4	5

Note: Out of the above suggestive LLOs –

1. '*' Marked Practicals (LLOs) Are mandatory.
2. A minimum of 80% of the above list of lab experiments are to be performed.
3. A judicial mix of LLOs is to be performed to achieve the desired outcomes

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

Micro-project:

a. Prepare a sketchbook consisting of components of building (for Sketches which are not included in Practical sketchbook).
b. Collect the relevant information of recent technologies in building construction and prepare a report on it.
c. Identify the different types of cracks and remedial measures and submit a report on case study.
d. Collect the relevant information of different techniques of demolition of existing structure and submit a report on it.
e. Prepare a summary report with reference to content in any one part of National Building Code.
f. Identify the different materials used for façade and submit a report on it.

Assignment:

a. Classify minimum three buildings near by your institute with reference to National Building Code- Part III (2005) and prepare a report.
b. Identify the components of a building by inspecting the available model and prepare a report.

c. Visit to a construction site to observe brickwork, Sill, Lintel, Chajja, Slab, Parapet wall and prepare a report.
d. Identify types of foundation by inspecting available models and prepare a report.
e. Search software/freeware for the course content and write the report stating their applications.
f. Market Survey to study Termite proofing, Damp Proofing, Water Proofing materials available in your City.

VII. LABORATORY EQUIPMENT /INSTRUMENTS /TOOLS /SOFTWARE REQUIRED

Sr. No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Optical Square, Ranging rod, Pegs. Arrows. Line dori, Lime powder, Measuring Tape, Hammer of standard size and specification as per civil engineering application	2,3
2	Bricks, Plumbs, Mason Square. Level tube, Line dori, Lime	2,3,4,5,13
3	Models: a. Model of a civil engineering structure depicting various components. b. Cut section of building showing different components c. Types of Bonds in Brick masonry. d. Types of Door and Windows. e. Types of Stairs. f. Types of Roofs. g. Formwork for different RCC elements.	1,2,3,4,5,8,9,10, 12,14

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	Overview of building components	CO1	05	02	02	04	08
2	II	Construction of Substructure	CO2	10	04	04	08	16
3	III	Construction of Superstructure	CO3	14	04	06	10	20
4	IV	Building communication and ventilation.	CO4	10	04	04	08	16
5	V	Building Finishes	CO5	06	02	02	06	10
Grand Total				**45**	**16**	**18**	**36**	**70**

IX. ASSESSMENT METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
Tests,Term work, Self-Learning (Assignment) , Question Answer in Classroom, Quiz and Group Discussion. Each practical will be assessed considering- 60% weightage to process and 40% weightage to product.	End Term Exam, Pen Paper test.

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	1	2	2	2	2	2	2	2
CO2	3	2	3	3	2	2	2	2	3	3
CO3	1	1	3	3	2	1	2	3	3	2
CO4	1	1	2	2	1	1	2	1	2	2
CO5	1	1	2	2	2	1	2	2	2	2

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

XI.SUGGESTED LEARNING MATERIALS /BOOKS

Sr. No	Author	Title	Publisher
1	S. P. Arora and Bindra	Building Construction	Dhanpat Rai Publication, Delhi Edition 2013,ISBN: 9788189928803
2	Francis D.K. Ching	Building construction illustrated	Wiley India, USA, 2014,ISBN: 978-1 118-45834-1
3	S. C. Rangawala	Building Construction	CharotarPublication,Dist-Anand ISBN-13: 978-8185594859
4	B. C. Punmia and A.K.Jain S.K	Building Construction	Firewall Media, 2005 ISBN 9788170080534
5	S.K. Sharma	Building Construction	S. Chand and Co. Pvt. Ltd., New Delhi (ISBN:978-81-219-0479-7)
6	Dr.JanardanZha	Building Construction	Khanna Publication, New Delhi 2007, ISBN-8174091106
7	S.S Bhavikatti	Building Construction	Vikas Publication House Pvt. Ltd., New Delhi (ISBN: 978-93259-6079-4)
8	SandipMantri	A to Z Building Construction	Satya Prakashan; New Delhi (2015) ISBN-13: 978-8176849692
9	All India Council for Technical Education	PWD Handbooks for Materials, Masonry, Building, Plastering and Pointing- Founadtion.	All India Council for TechniclEducation(AICTE)
10	Khanna	Practical Civil Engineering Handbook	Khanna Publication
11	BIS	National Building Code	Bureau of Indian Standard, New Delhi
12	BIS	BIS 962-1989 Code of Architectural and Building Drawing	Bureau of Indian Standard, New Delhi
13	BIS	BIS 1038- 1983 Steel Doors, Windows and Ventilators	Bureau of Indian Standard, New Delhi

XIII. LEARNING WEBSITES & PORTALS

Sr. No	Link/Portal	Description
1	https://www.youtube.com/watch?v=C6x_ersOn_o	Building Blocks of Bharat
2	https://www.youtube.com/watch?v=3XGt-p-hpdU	Brick Masonry Construction
3	https://www.youtube.com/watch?v=L-VGe2j53NU	15 Essential Tips for Building a 4" Thick Brick Masonry Wall: Expert Construction Guide
4	https://www.youtube.com/watch?	Introduction to fix formwork for column at site
5	https://www.youtube.com/watch?	Steps of Plastering
6	https://youtu.be/HRXXPYpP1Y8 https://youtu.be/E_MGiQnKbOY s	Steel pipe pile driving
7	https://youtu.be/vIdhkbDc6aw	Construction of compaction piles
8	https://youtu.be/mgrSSmOeqvc	mechanical driving of under reamer with bucket.
9	https://youtu.be/_DK531tBubQ	well point method of dewatering.

Name & Signature:

Mrs.Sindhu. R Panapalli
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Mrs.A.P.Shinde
Lecturer in Civil Engineering

(Course Experts)

Name & Signature:	Name & Signature:
Shri.V.G.Tambe (Programme Head)	**Shri.S.B.Kulkarni** (CDC In-charge)

GOVERNMENT POLYTECHNIC,PUNE
'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/ME/MT
PROGRAMME CODE	01/04/05
COURSE TITLE	ENGINEERING MECHANICS
COURSE CODE	AM21201
PREREQUISITE COURSE CODE & TITLE	NA

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	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
AM21201	ENGINEERING MECHANICS	DSC	2	3	--	2	1	6	3	30	70	100	40	25	10	25@	10	25	10	175

Total IKS Hrs for Term: 2 Hrs

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

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

II. RATIONALE:

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

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

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

CO1: Identify the force systems for given conditions by applying the basics of mechanics.
CO2: Select the relevant simple lifting machine(s) for given purposes.
CO3: Determine unknown force(s) of different engineering systems.
CO4: Check the stability of various force systems.
CO5: Apply the principles of friction in various conditions for useful purposes.
CO6: Find the centroid and centre of gravity of various components in engineering systems.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
UNIT-I MECHANICS AND FORCE SYSTEM (CL Hrs-04, Marks-06)				
1.	TLO 1.1 Explain concepts of the given terms. TLO 1.2 . Use the relevant units of various quantities in the given situations. TLO 1.3 Explain effects of a force on the given object. TLO 1.4 Identify the force system for the given situation.	**1.1** Introduction **1.2** Derived unit, system of unit, Scalar and Vector quantity, **1.3** Definition of Applied Mechanics, Statics, Dynamics, Kinematics, and Kinetics. **1.4** Definition of Gravity, Mass, Weight, Inertia Newton's law of Gravitation and Newton's laws of motion.	Direct Instruction & Model Demonstration	**CO1**
UNIT-II SIMPLE MACHINES (CL Hrs-07, Marks-12)				
2	TLO2.1:Describethe components of the given lifting machine. TLO2.2:Differentiatethe working principle of the given two types of simple lifting machines. TLO 2.3: Determine velocity ratio. efficiency and law of the given simple lifting machine. TLO 2.4: Calculate effort required and load lifted by the given simple lifting machine. TLO 2.5: Interpret the graphs after drawing them with the given data. TLO 2.6: Select the relevant simple lifting machine required for the given purpose with justification.	2.1 Definition of simple machine, mechanical advantage, velocity ratio, efficiency. Relation between them, friction in machines, effort lost in friction (Pf). 2.2 Reversibility, law of machine, max MA and max efficiency. Numerical on general simple lifting machines. 2.3 Study of machine - differential axle and wheel, simple screw jack, worm & worm wheel, single purchase crab only. Numerical to determine V.R, Pf, M.A., and efficiency	Direct Instruction & Model Demonstration	**CO2**
UNIT-III RESOLUTION AND COMPOSITION OF FORCES (CL Hrs-06, Marks-08)				
3	TLO 3.1 Resolve the given single force. TLO3.2 Calculate the resultant of the given force system analytically. TLO3.3 Determine graphically the resultant of the given force system. TLO 3.4 Find the resultant of the given force system using law of triangle and law of parallelogram.	3.1 Concept of force, unit force, graphical representation of force, Principle of transmissibility. 3.2 Systems of forces, coplanar, non-coplanar, concurrent non-concurrent, Parallel. 3.3 Resolution of a force, resolved parts, orthogonal and non-orthogonal. Components of a force. 3.4 Concept of composition & resultant of Forces. 3.5 Law of Parallelogram of forces, Triangle law of forces,	Direct Instruction & Model Demonstration	**CO1, CO3**

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

		numerical to be set on hollow objects in theory paper.) **6.4** Centre of gravity of simple solids-cylinder, cone, sphere, and C.G of compound solid objects made up of any two solids.		

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

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
1	LLO1: Verification of Resolution and composition of Forces	1. To verify Law of polygon of Forces	2	CO1
2	LLO2 : Verification of Equilibrium of Forces	2. To verify Law of Moments. 3. To verify Lami's Theorem 4. To determine Beam Reactions 5. Graphic Statics: On Graph papers solve graphically two problems each on resultant of concurrent and parallel forces 6. Graphic statics- On Graph papers solve graphically Two problems on beam reactions	2 2 2 6 6	CO1, CO2, CO3, CO4
3	LLO3: Determine the Coefficient of Friction for various surfaces	7. To Determine coefficient of friction for different surfaces in contact .(Minimum two different surfaces to be studied)	2	CO5
4	LLO4: Application of Law of machine for Lifting Machines	8. To study various lifting machines –To plot graphs for load Vs effort ,load Vs Efficiency and obtain law of machine for Differential axle and wheel, Worm and worm wheel, simple screw jack, Single purchase crab	2	CO2
5	LLO5: Practical Application of Knowledge of Applied Mechanics	9. Complete a micro project based on guidelines provided in Experiment No. 07	2	CO1, CO2, CO3, CO4, CO5, CO6

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

Micro project

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

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

A. Types of Forces: Prepare chart showing real-life examples indicating various types of forces

B. Lifting Machine Collect photographs of specific simple lifting machine and relate these machines with the machines being studied and prepare models of simple lifting machines using simple tools.

C. Types of support: Prepare chart showing actual and corresponding schematic diagram of various type of support

D. Beams: Prepare models of beam subjected to point loads, uniformly distributed leads simply supported, overhang and cantilever type beam.

E. Friction: Prepare chart regarding type of friction in various field conditions.

Assignment

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

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

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

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

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

Sr. No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Mechanics and force system	CO1	4	2	2	2	6
2	II	Simple Machines	CO2	7	2	4	6	12
3	III	Resolution and composition of Forces	CO1,CO3	10	2	4	8	14
4	IV	Equilibrium	CO1,CO3, CO4	10	2	2	10	14
5	V	Friction	CO1,CO3, CO5	7	2	4	6	12
6	VI	Centroid and Centre of Gravity	CO1, CO6	7	2	2	8	12
			Grand Total	**45**	**12**	**18**	**40**	**70**

IX. ASSESSMENT METHODOLOGIES/TOOLS

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

X. SUGGESTED COS- POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes(POs)							Programme Specific Outcomes *(PSOs)		
	PO-1 Basic and Discipline-Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	3	2	2	1	--	1	--	--	--
CO2	3	3	2	1	2	--	1	--	--	--
CO3	3	2	2	2	3	--	1	--	--	--
CO4	2	2	2	2	--	--	1	--	--	--
CO5	1	2	2	2	1	---	1	--	--	--
CO6	2	1	2	3	--	--	1	--	--	--

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

XI.SUGGESTED LEARNING MATERIALS/BOOKS

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

XIII. LEARNING WEBSITES & PORTALS

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

Name & Signature: **Mr. Hanumant P. Naiknavare** Lecturer in Applied Mechanics **(Course Experts)**	
Name & Signature: **Shri. V.G.Tambe** (Programme Head)	Name & Signature: **Shri. S.B. Kulkarni** (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/ ME/MT
PROGRAMME CODE	01/04/ 05
COURSE TITLE	APPLIED PHYSICS
COURSE CODE	SC11204
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 Hrs.	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	
SC11204	APPLIED PHYSICS	DSC	3	0	2	1	6	3	2	30	70*#	100	40	25	10	25@	10	25	10	175

Total IKS Hrs for Term: 02 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:

This course is designed with some fundamental information to help diploma engineers apply the basic concepts and principles of physics to solve broad-based engineering problems. The study of basic principles and the concepts of motion, elasticity, viscosity, surface tension, sound, heat, optics, photo electricity and X-rays will help in understanding the technology courses where emphasis is laid on the applications.

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

Students will be able to achieve and 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: Select relevant material in industries by analyzing its physical properties.
CO3: Apply the concept of simple harmonic motion, resonance and ultrasonic waves for various engineering applications.
CO4: Use basic principles of heat in related engineering problems.
CO5: Use basic principles of optics in related engineering problems.
CO6: Apply the concept of modern Physics (X-rays, LASER, Photocell) for various engineering

applications.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
	UNIT-I GENERAL PHYSICS (CL Hrs-7, Marks-12)			
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. **TLO 1.2:** Calculate the angular velocity of the given body. Derive equations of Angular motion. **TLO 1.3:** To Study range, angle of projection and maximum height of projectile.	**1.1 Units and Measurements:** Introduction, Definition of unit, Fundamental and derived units. Different System of units, Dimensions of physical quantities, measurement errors. **1.2 Angular Motion**: Definition, radius vector, angular displacement, angular velocity, angular acceleration and units, relation between linear and angular velocity, relation between linear acceleration and angular acceleration. Analytical Treatment. **1.3 Projectile motion:** Projectile motion, trajectory, range of projectile, angle of projection, time of flight.	Chalk and board Improved lecture, Tutorial Assignment Demonstration	CO1
	UNIT-II PROPERTIES OF MATTER (CL Hrs -10, Marks-14)			
2	**TLO 2.1** Apply the concept of elasticity and plasticity to select the material for engineering applications. **TLO 2.2** Apply the concept of Surface Tension to find the coefficient of Viscosity. **TLO2.3.** Establish a relation between given types of moduli of elasticity.	**2.1 Surface Tension:** Definition and unit, molecular theory of surface tension. Cohesive and adhesive forces, angle of contact and its significance, the shape of the liquid surface in a capillary tube, capillary action and examples, surface tension by capillary rise method (no derivation), effect of impurity and temperature on surface tension. analytical treatment. **2.2 Viscosity:** Definition, velocity gradient and its unit, Newton's law of viscosity, terminal velocity, Stokes law, Stokes formula, coefficient of viscosity by Stokes method (no derivation), types of flow of liquid - streamline flow, turbulent flow, Reynold's number (significance), applications and analytical treatment. **2.3 Elasticity:** Deforming Force and Restoring Force, Elasticity, Plasticity,	Chalk and board Improved lecture, Tutorial Assignment Demonstration Educational Games	CO2

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
		Rigidity. Stress and Strain and their types, elastic limit and Hooke's law, types of moduli of elasticity, analytical treatment.		
UNIT-III WAVES & OSCILLATIONS (CL Hrs-07, Marks-10)				
3	**TLO 3.1:** To study the properties of sound waves. **TLO 3.2** Find the parameters required to analyze the given wave motion and simple harmonic motion. **TLO 3.3** Explain the concept of resonance and its applications. **TLO 3.4** Describe the properties of given ultrasonic waves.	**3.1 Sound:** Sound waves, amplitude, frequency, time-period, wavelength and velocity of the wave, the relation between velocity, frequency and time-period of a wave. Analytical Treatment. **3.2 SHM:** Simple Harmonic Motion, Uniform Circular Motion as Simple Harmonic Motion, Equation of Simple Harmonic Motion, Phase of Simple Harmonic Motion. **3.3 Resonance:** Resonance concept in prehistoric times, the concept of different frequencies (Mantras) used to ignite different chakras in the body (IKS). Applications of resonance. **3.4 Ultrasonic waves:** Properties of ultrasonic waves. Applications of ultrasonic waves.	Chalk and board Improved lecture, Tutorial Assignment Demonstration.	CO3
UNIT- IV HEAT (CL Hrs-6, Marks-10)				
4	**TLO.4.1:** To study different Gas laws. **TLO 4.2:** Distinguish Between Good Conductors and Bad Conductors of Heat. **TLO 4.3:** Introduction of Thermodynamics	**4.1 Gas Laws:** Explanation of Gas laws, Boyle's law, Charles law, Gay Lussac's law, General Gas Equation, analytical treatment, units of temperature ^0C, ^0K, ^0F with their conversion, absolute scale of temperature. **4.2 Heat:** modes of heat transfer, conduction, convection and radiation. **4.3** Introduction of Thermodynamics	Chalk and board Improved lecture, Tutorial Assignment Demonstration.	CO4
UNIT –V OPTICS (CL Hrs-6, Marks-10)				
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.	**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 reflection of light.	Chalk and board Improved lecture, Tutorial Assignment Demonstration.	CO5

Sr. No	Theory Learning Outcomes (TLO'S) aligned to CO's.	Learning content mapped with TLO's.	Suggested Learning Pedagogies	Relevant COs
		5.2 Fiber optics: Propagation of light through optical fiber, the structure of the optical fiber, numerical aperture, acceptance angle, acceptance cone, types of optical fibers, applications of optical fiber, comparison of optical fiber communication with electrical cable communication, analytical treatment.		
	UNIT - VI MODERN PHYSICS (CL Hrs-9, Marks-14)			
	TLO 6.1 Explain the properties of photons based on Planck's hypothesis. **TLO 6.2** Explain the construction and working of a given photoelectric device. **TLO 6.3** Explain the method to produce X-rays with its properties and engineering applications. **TLO 6.4** Differentiate between LASER and ordinary light. **TLO 6.5** Describe the properties of nanomaterials.	**6.1 Photoelectricity:** Planck's hypothesis, properties of photons.Photoelectric effect: threshold frequency, threshold wavelength, stopping potential, Work function, characteristics of the photoelectric effect, Einstein's photoelectric equation Photoelectric cell and LDR: Principle Working and applications. **6.2 X-rays:** Production of X-rays by modern Coolidge tube, properties and engineering applications. **6.3 LASER:** Laser: properties, absorption, spontaneous and stimulated emission, Population inversion, active medium, optical pumping, three energy level system, He-Ne Laser. Engineering applications of Laser. **6.4** Introduction to Nanotechnology.	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	Measurements of dimensions of the given object	**2**	**CO 1**

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
	Measure the dimensions of given objects. Measure the dimensions of objects of known dimensions. LLO 2.2 Estimate the errors in measurement	by Vernier caliper.		
3	LLO3.1 Use a Micrometer Screw gauge to Measure the dimensions of given objects. Measure the dimensions of objects of known dimensions. LLO 3.2 Estimate the measurement errors.	Measurements of dimensions of given objects by micrometer screw gauge.	2	CO1
4	LLO 4.1 Study of Projectile motion.	Predict the range of the projectile from the initial launch speed and angle.	2	CO1
5	LLO5.1 Use Capillary Rise Method to study Surface Tension.	Determine surface tension by capillary rise method.	2	CO2
6	LLO6.1 Use Stokes's method to determine the coefficient of viscosity.	Measure the coefficient of viscosity of a given liquid using Stokes's method (Stokes law).	2	CO2
7	LLO7.1 Use Hooke's Law to calculate Spring constant.	Calculate the spring constant using Hooke's law.	2	CO2
8	LLO 8.1 Use a resonance tube to determine the velocity of sound. (Concept of resonance).	Determine the velocity of sound by using a Resonance Tube. (Concept of resonance).	2	CO3
9	LLO 9.1 Use a simple pendulum to determine the acceleration due to gravity.	Determination of Acceleration due to Gravity by Simple Pendulum.	2	CO3
10	LLO 10.1 Use Boyle's Law to study the relation between pressure and volume for a given gas.	Verify Boyle's law and establish a relation between pressure and volume for a given gas.	2	CO4
11	LLO 11.1 Use the Refraction Phenomenon to determine the refractive index of the glass slab.	Determination of the refractive index of the glass slab.	2	CO5
12	LLO 12.1 Use of He-Ne laser beam, to study properties of LASER.	Study the properties and working of the laser using a He-Ne laser beam.	2	CO6
13	LLO 13.1 Use photoelectric cells to study the effect of : Intensity of light on photoelectric current.	Study the effect of the Intensity of light on photoelectric current.	2	CO6

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
14	LLO 14.1 Use photoelectric cells to study the effect of : Applied potential on photoelectric current.	Study effect of Applied potential on photoelectric current. using Photoelectric cell	2	CO6
15	LLO 15.1 Study of Divergence of LASER.	Determine the divergence of laser beam	2	CO6

Note: A suggestive list of practical LLOs is given in the table, more such practical LLOs can be added to attain the COs and competency. A judicial mix of a minimum of 12 or more for physics practical LLOs needs to be performed so that the student reaches the 'Precision Level' of Dave's 'Psychomotor Domain Taxonomy' as generally required by the industry. ii. Hence, the 'Process' and 'Product' related skills associated with each LLOs of the laboratory work are to be assessed according to a suggested sample of Performance Indicators (Weightage in %) as follows:

1) Preparation of experimental set up 20%
2) Setting and operation 20%
3) Safety measures 10%
4) Observations and Recording 10%
5) Interpretation of result and Conclusion 20%
6) Answer to sample questions 10%
7) Submission of the report in time 10%.

VI. SUGGESTED MICROPROJECT/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 Self Learning Assessment (SLA). 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:

- Vernier calipers: Prepare prototype vernier caliper of desired least count using card sheet
- Properties of matter: Prepare a chart of different viscous liquids.
- Sound: Prepare a chart of the velocity of sound in different materials.
- Heat: Collect good and bad conducting materials of heat
- Mobile applications: Use mobile applications for conversions 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.
- LASER: Prepare a chart to study Total Internal Reflection.
- X-rays/Photoelectric cell: Prepare a chart showing the properties and applications of X-rays and Photoelectric cells.

Assignment:

- Convert the units of a given physical quantity from one system of units to another.
- Prepare a chart to summarize units and measurements.
- Distinguish between transverse waves and longitudinal waves based on frequencies explain infrasonic waves, audible sound waves and ultrasonic waves.
- Collect different elastic materials and mention their Young's modulus.
- 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 fibers in, engineering.
- Applications of X-Ray in engineering.
- Applications of LASER in engineering.
- Applications of Photoelectricity in engineering.

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.	2
2	Micrometer screw gauge: Range 0-25 mm, Resolution 0.01 mm.	3
3	Simple pendulum, Stop Watch.	4
4	Glass Slab 75x50x12mm.	10
5	Travelling microscope: Range: 0.05-22 cm, Resolution 0.001 cm, Capillary tube	5
6	Battery eliminator (0-12 V, 2 A)	11,12,13
7	Voltmeter(0-10 V), ammeter (0-5 A)	1
8	Boyle's law apparatus.	10
9	Stoke's apparatus, Wooden scale, Small metal sphere.	6
10	Hooke's law apparatus	7
11	Resonance tube, Tuning fork set, Rubber pad.	8
12	Photoelectric cell.	12,13
13	He-Ne laser kit	11

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**	3	4	5	12
2	II	Properties of Matter	CO2	**10**	4	4	6	14
3	III	Waves And Oscillations	CO3	**7**	3	3	4	10
4	IV	Heat	CO4	**6**	3	4	3	10
5	V	Optics	CO5	**6**	3	4	3	10
6	VI	Modern Physics	CO6	**9**	4	5	5	14
Grand Total				**45**	**20**	**24**	**26**	**70**

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
Two Unit Tests of 30 marks and the average of two unit tests. For Laboratory Learning 25 MARKS	End Semester assessment of 25 marks for laboratory learning. End Semester assessment of 70 marks (Online)

X. SUGGESTED COs- POs MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline - Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	2	-	1	1	1	2			
CO2	3	2	1	2	1	1	2			
CO3	3	1	1	1	1	1	2			
CO4	3	1	1	1	1	1	2			
CO5	3	1	1	1	1	1	2			
CO6	3	1	1	2	2	1	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 with ISBN Number
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

XII. 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
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
(Course Experts)

Mr A.D.Ghorpade
Lecturer in Physics

Name & Signature:

(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	PROFESSIONAL COMMUNICATION
COURSE CODE	HU11202
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	
HU11202	PROFESSIONAL COMMUNICATION SKILLS (PCO)	SEC	-	-	2	-	2	1	-	-	-	-	-	25	10	25@	10	-	-	50

Total IKS Hrs for Sem. : 0 Hrs

Abbreviations: CL- Classroom Learning, TL- Tu tutorial Learning, LL-Laboratory Learning, SL H-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 :

1. FA-TH represents the average of two class tests of 30 marks each conducted during the semester.
2. If the candidate does not secure minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If the candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self-learning hours shall not be reflected in the timetable.
7. * Self-learning includes micro-projects/assignments / other activities.

II. RATIONALE:

Communication is key to the smooth and efficient functioning of any industry or business. Professional communication is the need of every organization to maintain ethics, quality and standards. The efficacy of business communication skills is essential for engineering professionals to instruct, guide and motivate peers/ subordinates to achieve desired goals at the workplace. Thus, this course has been designed to enhance professional communication skills for effective presentation both in written and oral forms at the workplace.

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

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

- CO1 - Communicate effectively (oral and written) in various formal and informal situations minimizing the barriers.
- CO2 - Develop listening skills through active listening and note-taking.
- CO3 - Write the circulars, notices and minutes of the meeting.
- CO4 - Draft enquiry letter, complaint letter, and Job application with resume / CV, Compose effective Emails.

- CO5 - Write Industrial reports.

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 PROFESSIONAL COMMUNICATION: AN OVERVIEW			
1	TLO 1.1 Describe the importance of professional communication in given situations. TLO 1.2 Identify the types of communication barriers in given situations and suggest remedies. TLO 1.3 Use different types of verbal and non–verbal communication for the given situation.	1.1 Definition of professional communication- Importance, relevance, Elements and process of communication,7 C's of Professional Communication (Clarity, Conciseness, correctness, coherent, concrete, courteous & Complete). 1.2 Communication barriers, Types of barriers (Linguistic, Psychological, Technological). 1.3 Types of Communication– Verbal (Oral-Written), Formal, Informal (Grapevine) and Vertical Comm.	Language lab, Role plays, Chalkboard, Reference books, Case studies.	CO1
	UNIT - II LISTENING & NOTE-TAKING			
2	TLO 2.1 Identify the difference between listening and hearing. TLO 2.2 Differentiate the types of listening in various situations. TLO 2.3 Take notes during lectures and seminars. Make use of types of note-taking and note-making for different subjects/topics.	2.1 Difference between listening & Hearing. 2.2 Types of listening a)Active listening b)Passive listening c)Selective listening. 2.3 Techniques of Note-taking, Types of note taking (Outline notes, Mind Mapping, Flowcharts).	Language Lab, Classroom learning, NPTEL, Role Play.	CO2
	UNIT - III OFFICE DRAFTING			
3	TLO 3.1 Prepare notices/agenda for the given type of meeting/information. TLO 3.2 Prepare minutes of meeting/s. TLO 3.3 Draft a circular for a particular information/event.	3.1 Format of Notice, Drafting Agenda. 3.2 Preparing Minutes of the meeting. 3.3 Format of Circular.	Whiteboard, Language Lab, Reference books, Classroom learning.	CO3
	UNIT - IV WRITING SKILLS FOR PROFESSIONAL COMMUNICATION			
4	TLO 4.1 Compose cover letter and CV / Resume for jobs. TLO 4.2 Apply E-mail Etiquettes for professional purposes. TLO 4.3 Compose Emails for different official purposes.	4.1 Job Application with Resume / CV. 4.2 E-Mail Etiquettes. 4.3 Writing official E-Mails to communicate intended purposes.	Language lab, Classroom learning NPTEL, Reference books.	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 REPORT WRITING			
5	TLO 5.1 Compose technical reports. TLO5.2 Draft accident and Investigation.	5.1 Introduction to report writing 5.2 Accident Report and Investigation Report.	Chalk and talk, Language Lab, Collaborative learning, Classroom learning.	**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 Draw the communication cycle using real-life examples and explain the process of communication.	Communication Process and Cycle	2	CO1
2	LLO 2.1 Undertake the Roleplay / Group discussion to illustrate types/barriers to communication.	Role plays and Group Discussion	2	CO1
3	*LLO 3.1 Listen to audio in the language lab and make notes of it.	Active Listening	2	CO2
4	*LLO 4.1 Give a presentation / Seminar using the 7 C's of Communication.	Presentations / Seminars	2	CO1
5	*LLO 5.1 Explain the types of note-taking with examples and make notes on any one topic related to your curriculum.	Note taking & Note Making	2	CO2
6	*LLO 6.1 Prepare agenda for meeting and draft minutes of the meeting.	Agenda and Minutes of the Meeting	2	CO3
7	*LLO 7.1 Draft circulars for the given situation.	Office Drafting	2	CO3
8	*LLO 8.1 Respond to job advertisements referring to newspapers, and LinkedIn. Write a cover letter with a resume /CV.	Job Application with Resume / CV	2	CO4
9	*LLO 9.1: Write Four (formal) E-mails using ethics and etiquette.	E-Mail writing.	2	CO4
10	*LLO 10.1: Write a detailed report on the Accident/ Investigation.	Technical Report writing	2	CO5
11	*LLO 11.1: Prepare a case study related to linguistic barriers: language pronunciation, punctuation, and technical jargon and suggest remedies for the same.	Barriers to Communication	2	CO1

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
12	LLO 12.1: draft complaint/enquiry letter for various situations.	Complaint and Enquiry letter	2	CO4
13	LLO 13.1: List psychological barriers to communication. LLO 13.2 Prepare case studies on any two psychological barriers and suggest remedies to overcome the barriers.	Psychological barriers to Communication.	2	CO1
14	*LLO 14.1 - Draw a flow chart and mind mapping for any topic related to the curriculum.	Listening Skills.	2	CO2
15	*LLO 15.1 - Face mock interview arranged by your teacher.	Job Application, Resume / CV & Interview.	2	CO4

Note:

- "*" marked practicals are compulsory for coverage of all course outcomes.
- The remaining practicals are recommended to provide enhanced skills/abilities.
- Any **12** assignments out of **15** are compulsory

Note:

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her at the beginning of the semester. She/he ought to submit it by the end of the semester to develop the industry-oriented COs. Each micro-project should encompass two or more COs. The micro-project could be industry application-based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain a dated work diary consisting of individual contributions to the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than 15 (fifteen) student engagement hours during the course. In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become a problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty.

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

Micro project

- Conduct an interview of any person and follow the procedure (interview questions, photo with the interviewee etc.)
- Listening and Speaking are lifelong learnings. Explain with appropriate examples and real-life case studies.
- Collect (four to five) emails with technical jargon, and barriers, make required corrections and keep a record of both the emails (original and Corrected one)
- Prepare a case study on Technological barriers to communication
- Complete any one certification course of (Two Weeks duration) from (MOOC/ NPTEL/ Coursera/ any other source)related to Communication Skills / Personality Development.
- Prepare a report on aspects of body language.

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

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Language Lab with software with internet facility.	All
2	LCD Projector	All
3	Smart Board with networking.	All
4	Printer.	All

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

N.A.

IX. ASSESSMENT METHODOLOGIES/TOOLS:

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
1. Term Work **(FA-PR)** 2. Micro-project.	1. Practical Exam of **25** marks using language lab. **(SA-PR)**

X. SUGGESTED COs- POs MATRIX FORM:

Course Outcomes (COs)	Programme Outcomes(POs)							ProgrammeSpecific 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	-	-	-
CO2	-	-	-	-	-	-	1	-	-	-
CO3	-	-	-	-	-	-	1	-	-	-
CO4	-	-	-	-	-	-	1	-	-	-
CO5	-	-	-	-	-	-	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 with ISBN Number
1	M Ashraf Rizvi	Effective Communication Skills	Tata McGraw-Hill Publication-ISBN 0070599521, 9780070599529
2	Sanjay Kumar and Pushp Lata	Communication Skills	Oxford University Press ISBN 9780199457069
3	MSBTE Textbook	Communication Skills	MSBTE
4	Robert King	Effective communication Skills	Audio Book -ISBN 978181667009742
5	N P Sudharshana, C Savitha	English for Technical Communication	Cambridge-ISBN 978-13-16640-08-1
6	C, Murlikrishna, Sunita Mishra	Communication Skills for Engineers	Pearson - ISBN 978-81-317-3384-4
7	Meenakshi Raman, Sangeeta Sharma	Technical Communication, Principles and Practice	Oxford University Press -ISBN 978-1316640-08-1
8	K. K. Sinha	Business Communication	Galgotiya Publishing company, New Delhi ISBN 9789356227064
9	Rajendra Pal, J.S. Korlahalli	Essentials of Business Communication	Sultan Chand & Sons, New Delhi ISBN 9788180547294

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.britishcouncil.in	Conversations
2	https://www.coursera.org	Certification courses
3	https://www.udemy.com	Communication skills training courses
4	http://www.makeuseof.com	Dale Carnegie's free resources

Name & Signature:

Mr.V.V.Kulkarni
Lecturer in English

Dr.S.P.Palve
Lecturer in English

(Course Experts)

Name & Signature:	**Name & Signature:**
Shri.V.G.Tambe (Programme Head)	**Shri.S.B.Kulkarni** (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/EE/ET/ME/MT/CM/IT
PROGRAMME CODE	01/02/03/04/05/06/07
COURSE TITLE	APPLIED MATHEMATICS
COURSE CODE	SC11207
PREREQUISITE COURSE CODE & TITLE	BASIC MATHEMATICS (SC11205/SC11206)

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	
SC11207	APPLIED MATHEMATICS	AEC	3	1	-	-	4	2	3	30	70	100	40	-	-	-	-	-	-	100

Total IKS Hrs for Term: 6 Hrs

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

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

Note:

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

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

II. RATIONALE:

An Applied Mathematics course, covering integration, definite integration, differential equations, numerical methods, and probability distribution, equips engineering students with essential problem-solving tools. It enables them to model and analyze complex systems, make informed decisions and address real-world engineering challenges effectively.

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

Studentswillbeabletoachieve&demonstratethefollowing CO'soncompletionofcourse-basedlearning

CO1 - Apply Solve the broad-based engineering problems of integration using suitable methods.
CO2 - Use definite integration to solve given engineering related problems.
CO3 - Apply the concept of differential equation to find the solutions of given engineering problems.
CO4 - Employ numerical methods to solve programme specific problems.
CO5 - Use probability distributions to solve elementary engineering 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 Indefinite Integration (CL Hrs-15, Marks-20)				
1.	TLO1.1 Solve the given simple problem(s) based on rules of integration. TLO1.2 Evaluate the given simple integral(s) using substitution method. TLO1.3 Integrate given simple functions using the integration by parts TLO1.4 Solve the given simple integral bypartial fractions	**Unit - I Indefinite Integration** 1.1 Simple Integration: Rules of integration and integration of standard functions 1.2 Integration by substitution. 1.3 Integration by parts. 1.4 Integration by partial fractions (only linear non repeated factors at denominator of proper fraction).	Improved Lecture Demonstration Chalk-Board Presentations Video Demonstrations	**CO1**
Unit - II Definite Integration (CL Hrs-08, Marks-12)				
2.	TLO2.1 Solve given examples based on DefiniteIntegration. TLO2.2 Use properties of definite integration tosolve given problems	**Unit - II Definite Integration** 2.1 Definite Integration: Definition, rules of definite integration with simple examples. 2.2 Properties of definite integral (without proof) and simple examples	Video Simulation Chalk-Board Improved Lecture Presentations	**CO2**
Unit - III Differential Equation (CL Hrs-08, Marks-12)				
3.	TLO3.1 Find the order and degree of givendifferential equations. TLO3.2 Form simple differential equation for given elementary engineering problems. TLO3.3 Solve given differential equations using the methods of Variable separable and Exact Differential Equation (Introduce the concept of partial differential equation). TLO3.4 Solve given Linear Differential Equation.	**Unit - III Differential Equation** 3.1 Concept of Differential Equation. 3.2 Order, degree and formation of Differential equations **3.3** Methods of solving differential equations: Variable separable form, Exact Differential Equation, Linear Differential Equation.	Video Demonstrations Presentations Chalk-Board Improved Lecture Flipped Classroom	**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 Numerical Methods (CL Hrs-06, Marks-14)			
4.	TLO4.1 Find roots of algebraic equations by using appropriate methods. TLO4.2 Solve the system of equations in three unknowns by iterative methods TLO4.3 Solve problems using Bakhshali iterative method for finding approximate square root. (IKS)	**Unit - IV Numerical Methods** 4.1 Solution of algebraic equations: Bisection method, Regula falsi method and Newton –Raphson method. 4.2 Solution of simultaneous equations containing three Unknowns by iterative methods: Gauss Seidal and Jacobi's method. 4.3 Bakhshali iterative method for finding approximate square root. (IKS)		**CO4**
	Unit - V Probability Distribution (CL Hrs-08, Marks-12)			
5.	TLO5.1 Solve given problems based on repeated trials using Binomial distribution TLO5.2 Solve given problems when number of trials are large and probability is very small. TLO5.3 Utilize the concept of normal distribution to solve related engineeringproblems	**Unit - V Probability Distribution** 5.1 Binomial distribution. 5.2 Poisson's distribution. 5.3 Normal distribution.		**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 Integration by substitution	*Integration by substitution	1	CO1
2	LLO 2.1 Solve integration using by parts	*Integration by parts	1	CO1
3	LLO 3.1 Solve integration by partial fractions(only linear non repeated factors at denominator of proper fraction).	Integration by partial fractions.	1	CO1
4	LLO 4.1 Solve examples on Definite Integral based on given methods.	Definite Integral based on given methods.	1	CO2
5	LLO 5.1 Solve problems on properties of definite integral.	*Properties of definite integral	1	CO2
6	LLO 6.1 Solve given problems for finding the area under the curve and volume of revolution.	* #Area under the curve and volume of revolution.(Only for Civil, Mechanical Metallurgical Engineering)	1	CO2

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
7	LLO 7.1 Solve examples on mean value and root mean square value.	* #Mean value and root mean square value. (Only for Information Technology, Computer, Electrical and Electronics Engineering)	1	CO2
8	LLO 8.1 Solve examples on order, degree and formation of differential equation.	Order, degree and formation of differential equation.	1	CO3
9	LLO 9.1 Solve first order first degree differential equation using variable separable method.	Variable separable method.	1	CO3
10	LLO 10.1 Solve first order first degree differential equation using exact differential equation and linear differential equation.	*Exact differential equation and linear differential equation.	1	CO3
11	LLO 11.1 Solve engineering application problems using differential equation.	*Applications of differential equations.(Take programme specific problems)	1	CO3
12	LLO 12.1 Solve problems on Bisection method and Regula falsimethod.	*Bisection method and Regula falsi method.	1	CO4
13	LLO 13.1 Solve problems on Newton-Raphson method.	Newton- Raphson method.	1	CO4
14	LLO 14.1 Solve problems on Jacobi's method and Gauss Seidal Method.	Jacobi's method and Gauss Seidal Method.	1	CO4
15	LLO 15.1 Use Bakhshali iterative methods for finding approximate value of square root. (IKS)	*Bakhshali iterative methods for finding approximate value of square root. (IKS)	1	CO4
16	LLO 16.1 Solve engineering problems using Binomial distribution.	*Binomial Distribution	1	CO5
17	LLO 17.1 Solve engineering problems using Poisson distribution.	*Poisson Distribution	1	CO5
18	LLO 18.1 Solve engineering problems using Normal distribution.	Normal Distribution	1	CO5
19	LLO 19.1 Solve problems on Laplace transform and properties of Laplace transform.	* # Laplace transform and properties of Laplacetransform.(Only for Electrical and Electronics Engineering)	1	CO2
20	LLO 20.1 Solve problems on Inverse Laplace transform and properties of Inverse Laplace transform.	* # Inverse Laplace transform and properties ofInverse Laplace transform.(Only for Electrical and Electronics Engineering)	1	CO2

Note : Out of above suggestive LLOs –

1. '*' Marked Practicals (LLOs) Are mandatory.
2. Minimum 80% of above list of Tutorials are to be performed.
3. Judicial mix of LLOs are to be performed to achieve desired outcomes

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

Micro-project
NA

Assignment
NA

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr. No	EquipmentNamewithBroadSpecifications	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	Indefinite Integration	CO1	15	2	6	12	20
2	II	Definite Integration	CO2	8	2	4	6	12
3	III	Differential Equation	CO3	8	2	4	6	12
4	IV	Numerical Methods	CO4	6	2	4	8	14
5	V	Probability Distribution	CO5	8	2	4	6	12
Grand Total				**45**	**10**	**22**	**38**	**70**

IX. ASSESSMENT METHODOLOGIES/TOOLS

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

X. SUGGESTED COS- POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline-Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	1	-	-	1	-	1			
CO2	3	1	-	-	1	-	1			
CO3	3	2	1	1	1	1	1			
CO4	2	3	2	2	1	1	1			
CO5	2	2	1	1	2	1	2			

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

XI.SUGGESTED LEARNING MATERIALS/BOOKS

Sr. No	Author	Title	Publisher
1	Grewal B. S.	Higher Engineering Mathematics	Khanna publication New Delhi, 2013 ISBN: 8174091955
2	Dutta. D	A text book of Engineering Mathematics	New age publication New Delhi, 2006 ISBN: 978- 81-224-1689-3
3	Kreysizg, Ervin	Advance Engineering Mathematics	Wiley publication New Delhi 2016 ISBN: 978-81- 265-5423-2
4	Das H.K.	Advance Engineering Mathematics	S Chand publication New Delhi 2008 ISBN: 9788121903455
5	S. S. Sastry	Introductory Methods of Numerical Analysis	PHI Learning Private Limited, New Delhi. ISBN-978-81-203-4592-8
6	C. S. Seshadri	Studies in the History of Indian Mathematics	Hindustan Book Agency (India) P 19 Green Park Extension New Delhi. ISBN 978-93-80250-06-9
7	Marvin L. Bittinger DavidJ.Ellenbogen Scott A. Surgent	Calculus and Its Applications	Addison-Wesley 10th Edition ISBN-13: 978-0-321-69433-1
8	Gareth James, Daniela Witten,Trevor Hastie RobertandTibshirani	An Introduction to StatisticalLearning with Applications in R	Springer New York Heidelberg Dordrecht LondonISBN 978-1-4614-7137-0 ISBN 978-1-4614-7138-7 (eBook)

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	https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHo Pig	Concept of Mathematics through video lectures andnotes
3	https://www.wolframalpha.com/	Solving mathematical problems, performing calculations, and visualizing mathematical concepts.
4	http://www.sosmath.com/	Free resources and tutorials
5	http://mathworld.wolfram.com/	Extensive math encyclopedia with detailed explanationsof mathematical concepts
6	https://www.mathsisfun.com/	Explanations and interactive lessons covering variousmath topics, from basic arithmetic to advanced
7	http://tutorial.math.lamar.edu/	Comprehensive set of notes and tutorials covering awide range of mathematics topics.
8	https://www.purplemath.com/	Purplemath is a great resource for students seeking helpwith algebra and other foundational mathematics to improve learning.
9	https://www.brilliant.org/	Interactive learning in Mathematics

Sr. No	Link/Portal	Description
10	https://www.edx.org/	Offers a variety of courses
11	https://www.coursera.org/	Coursera offers online courses in applied mathematicsfrom universities and institutions around the globe.
12	https://ocw.mit.edu/index.htm	The Massachusetts Institute of Technology (MIT) offersfree access to course materials for a wide range of mathematical courses.

Name & Signature:

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Lecturer in Mathematics

Shri. Sachin B. Yede
Lecturer in Mathematics

(Course Experts)

Name & Signature:

Shri. V. G. Tambe
(Programme Head)

Name & Signature:

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

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/EE/ET/ME/MT/CM/IT
PROGRAMME CODE	01/02/03/04/05/06/07/08
COURSE TITLE	Surveying-1
COURSE CODE	CE31201
PREREQUISITE COURSE CODE & TITLE	-----

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	
CE31201	Surveying-1	SEC	4	0	4	0	8	4	3	30	70	100	40	50	20	25@	10	0	0	175

Total IKS Hrs for Term: 2 Hrs

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

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

Note:

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

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

II. RATIONALE:

Investigation of ground features is an important aspect in design, development and execution of civil engineering projects. Surveying facilitates compilation of ground features and is an integral part of all Civil Engineering projects. Effective training of young civil engineering diploma holders needs grooming of them in appropriate surveying skills. Surveying I course is aimed at imparting basic surveying skills like linear, angular and elevation measurements using different instruments and presenting the collected data through appropriate drawings

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

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

CO1: Suggest relevant type of survey required for the given situation.
CO2:Conduct traversing in the field using chain, cross staff and compass
CO3: Undertake survey using Theodolite for preparing a plan of the given terrain.
CO4: Determine Reduced Level to prepare Contour maps for the given type of terrain
CO5: Prepare plan using Plane table survey.
The aim of this course is to attain the following industry identified competency through various learning experiences:

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 1: Overview and Classification of Surveying (Hrs-08, Marks - 08)				
1.	TLO1.1 Explain the given basic principles of surveying Evaluate the given simple integral(s) using the substitution method. TLO1.2 Classify the survey based on purpose, instruments used and nature of field. TLO1.3 Use the conventional sign and symbols for preparing the plan of a given land	1.1 Surveying: Introduction, Purpose, use and Principles. 1.2 Types of surveying- Primary and Secondary classification, Plane, Geodetic, Cadastral, Hydrographic, Photogrammetry Aerial, Layout survey, Control survey, Topographical survey, Route survey, Reconnaissance survey. 1.3 Conventional sign and symbols	Demonstration Assignment Video Demonstrations Chalk-Board Presentations	CO1
UNIT 2: Cross Staff and Compass Surveying (Hrs-14, Marks - 14)				
2.	TLO 2.1 Describe the procedure of finding the distance between two given inter-visible and invisible survey stations. TLO 2.2 Explain the given Survey line and survey station used in survey. TLO 2.3 Explain the methods of ranging. TLO 2.4 Calculate the area of open field using chain and cross staff survey. TLO 2.5 Define Geographic/True Magnetic and Arbitrary Meridians and Bearings, Meridian and Bearing, TLO 2.6 Convert the Whole circle bearing to reduced bearing system and vise versa TLO 2.7 Calculate internal and external angle from bearing of line TLO 2.8 Determine the correct bearing from given Data TLO 2.9 Apply Bowditch's rule to complete the traverse of given land	2.1 Linear Measurement Instruments: Metric Chain, Tapes, Arrow, Ranging rod, Open cross staff (IKS) 2.2 Chain survey Station, Base line, Check line, Tie line, Offset, Tie station, Types of offsets: Perpendicular and Oblique 2.3 Ranging: Direct and Indirect Ranging. 2.4 Area Calculations of field by cross staff (Numerical problems) 2.5 Compass Traversing: open, closed. 2.6 Technical Terms: Geographic/True Magnetic and Arbitrary Meridians and Bearings, Meridian and Bearing, 2.7 Whole Circle Bearing System and Reduced Bearing System . Numerical on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, 2.8 Calculation of internal and external angles from bearings at a station. 2.9 Components of Prismatic Compass and their Functions (No sketch) Temporary adjustments and observing bearings	Demonstration Chalk-Board Hands-on Collaborative learning Video Demonstrations Model Demonstration Presentations	CO2

		2.10 Local attraction, Methods of correction of observed bearings- Correction at station and correction to included angles 2.11 Methods of plotting a traverse and closing error, Graphical adjustment of closing error		
UNIT 3 : Theodolite Surveying (Hrs-16, Marks - 20)				
3.	TLO 3.1 Explain the given components of a transit Theodolite. TLO 3.2 Explain the relationship between the given fundamental axis of theodolite along with typical characteristics TLO 3.3 Describe the procedure to measure the horizontal Angle using Theodolite for the given situation. TLO 3.4 Describe the procedure to measure vertical angles using Theodolite for the given situation. TLO 3.5 Compute Latitude, Departure, Consecutive co ordinates. Independent coordinates from the data given. TLO 3.6 Determine the type of traverse by undertaking relevant check in the given situation. TLO 3.7 Calculate the bearing from given angles. TLO 3.8 Apply Bowditch's rule along with Transit rule to balance the traverse for a given data. TLO 3.9 Prepare Gale's Traverse table for the given data.	3.1 Types and uses of Theodolite; Component parts of transit Theodolite and their functions, Reading the Vernier of transit Theodolite 3.2 Technical terms- Swinging, Transiting, Face left, Face right 3.3 Fundamental axes of transit Theodolite and their relationship 3.4 Temporary adjustment of transit Theodolite 3.5 Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition 3.6 Measurement of vertical Angle 3.7 Theodolite traversing by included angle method and deflection angle method 3.8 Checks for open and closed traverse, Calculations of bearing from angles 3.9 Traverse computation-Latitude, Departure, Consecutive coordinates, independent coordinates, Balancing the traverse by Bowditch's rule and Transit rule, Gale's Traverse table computation 3.10 Study Latitude, Longitudes of places in India by IKS 3.11 Study to compute the time of sunrise ,moonrise and sunset by IKS	Model Demonstration Chalk-Board Hands-on Collaborative learning Video Demonstrations Site/Industry Visit Case Study Demonstration Presentations	CO3
UNIT 4: Levelling and Contouring (Hrs-16, Marks - 20)				
1.	TLO 4.1 Explain the terms Level surfaces, level line, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Line of collimation, Back sight, Fore sight, intermediate sight, Change point, Height of instruments TLO 4.2 Explain the Construction of given levelling equipment with its silent features. TLO 4.3 Explain the temporary adjustments of dumpy level.	4.1 Terminologies: Level surfaces, level line, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Line of collimation, Back sight, Fore sight, intermediate sight, Change point, Height of instruments 4.2 Types of levels: Dumpy, Auto level, Digital level, Fundamental axis of Dumpy Level . Temporary	Model Demonstration Video Demonstrations Chalk-Board Hands-on Collaborative learning Presentations Demonstration Case Study	CO4

	TLO 4.4 Calculate Reduced Level of the given station using relevant method of surveying. TLO 4.5 Justify the relevant types of levelling with examples. TLO 4.6 Interpret the contour maps for the given type of topography. TLO 4.7 Describe the characteristics of contours for the given terrain.	adjustments of Level. 4.3 Types of Levelling Staffs: Self-reading staff and Target staff. 4.4 Reduced level by Plane of collimation method and Rise/ Fall Method 4.5 Find the R. L. by H.I. method with necessary checks (Numerical problems) 4.6 Find the R.L by Rise and Fall method with necessary checks. (Numerical problems) 4.7 Types of Leveling : Simple, Differential, Fly, Profile and Reciprocal Levelling 4.8 Contour, contour interval, horizontal equivalent. 4.9 Contour maps: Characteristics and uses of Contour maps 4.10 Methods of Locating Contour: Direct and Indirect		
UNIT 5: Plane table Surveying (Hrs-06, Marks - 08)				
5.	TLO 5.1 Explain the functions and use of the given type of accessories of a plane table. TLO 5.2 Describe the method of orienting the plane table in a given situation. TLO 5.3 Select the relevant method of plane tabling for a given situation.	5.1 Principle of plane table survey. 5.2 Accessories of plane table and their use, Telescopic alidade. 5.3 Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method 5.4 Methods of plane table surveys- Radiation, Intersection and Traversing. 5.5 Merits and demerits of plane table survey.	Model Demonstration Presentations Chalk-Board Collaborative learning Hands-on Demonstration Case Study	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.	RelevantCOs
1	LLO1- Identify the linear measuring Accessories.	Study of linear measuring instruments for land survey like Metric chains, Metric tapes , ranging rod, Peg, Arrow open cross staff, line ranger, optical square, Write construction & working , suitability of each instrument with labeled sketch.	02	CO1
2	LLO2- Identify the chain and cross staff working and construction	Chain and cross staff survey to locate the boundaries of a field or plot and to determine its area and recording the collected ground feature data in field book.	02	CO2
3	LLO 3-Calculate area of irregular figure	Determine area of irregular field using Digital Planimeter	02	CO2
4	LLO4- Identify the working and construction of Prismatic compass and measured bearings.	Study of Prismatic compass, Observing fore bearing and back bearing of lines, Calculation of included angles from the observed bearings.	02	CO2
5	LLO5- Identifying the stations affected by local attraction, correcting the bearings	Running a chain and compass closed traverse with 4 – 5 sides. Identifying the stations affected by local attraction, correcting the bearings. Plotting the traverse and correcting the same for closing error.	04	CO2
6	LLO6- Taking staff observation and calculation of RLs.	Undertake differential Levelling exercises involving taking reading, identifying the sights and recording in level book and reducing levels and carrying out arithmetical check by HI method with minimum 02 change point using Auto Level/Dumpy Level.	04	CO4
7.	LLO7- Taking staff observation and calculation of RLs.	Undertake differential Levelling exercises involving taking reading, identifying the sights and recording in level book and reducing levels and carrying out arithmetical check by Rise & fall method with minimum 02 change point using Auto Level/ Dumpy Level.	04	CO4
8	LLO8- Carry the Bench marks by using fly leveling.	Fly Levelling by using Auto Level(min 100m). Prepare location sketch and carryout TBM from 0 to 100 M	02	CO4
9	LLO 9 -Use transit theodolite to measure Horizontal angle by Direct Method.	Measure Horizontal angle by using Transit Theodolite by Direct Method	02	CO3

10	LLO 10- Use transit theodolite to measure Horizontal angle by method of Repetition	Measure Horizontal angle by using Transit Theodolite by method of Repetition	02	CO3
11	LLO 11- Use transit theodolite to measure Vertical angle	Measure vertical angle using Transit Theodolite	02	CO3
12	LLO12- Carry out plane table survey	Study and use of plane table and its accessories. Temporary adjustments of plane table.	02	CO5
13	LLO12- Carry out plane table survey	Plane tabling by method of intersection.	02	CO5
	Project			
1	PLO1 – Selection of stations Carrying profile survey Plotting L- section and C/section , marking gradient	Undertake the survey project with leveling Instrument for profile leveling and cross sectioning for a road length of 150 m with cross section at 20m interval Profile survey. Plot L section with minimum three cross section on A1 size imperial sheet for data collected in above survey project i.e 1A.	06 02	CO1 to CO5
2	PLO 2 – Selection of stations Carrying block contouring survey and prepare contour map	Undertake survey project for plotting contour map using block contouring method (100m x100m) with grid of 10 m x 10 m . Plot contours on A1 size imperial sheet for data collected in above survey project i.e 2A.	06 02	CO1 to CO5
3	PLO3 – Prepare traverse using Transit Theodolite	Use transit theodolite to carry out Survey Project for closed traverse for minimum 5 sides Plot the traverse by using Gales table A1 size imperial sheet for data collected in above	06 02	CO1 to CO5

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

The micro projects could be industry application based, internet based, workshop based, laboratory based or field based. Each micro project should encompass two or more COs. A suggestive list of micro projects is given below. Similar micro projects could be added by the concerned faculty.

1) Collect the information on survey instruments available in the market with Specifications.
2) Calibrate the given chain with reference to standard gauge.

3) Determine the reduced levels of given objects.
4) Collect and interpret given contour maps and prepare report on it.
5)Compare prismatic compass and surveyor compass.
6)Compare different types of tapes.
7)Compare different types of levels.
8)Compare types of planimeter.
9)Measure area between contours in a given contour plan
10)Undertake Theodolite operation and measurement of angles

Assignment

Other than the classroom and laboratory learning, following are the suggested student-related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

a. Visit to Survey Dept. of India to study maps, survey instruments.
b. Study and use of software's for surveying.

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr. No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Chain, Tape, open cross staff, Line ranger, Optical Square	LLO1
2	Chain, Tape, open cross staff, Line ranger, Optical Square, Prismatic Compass, Digital Planimeter	LLO2, LLO3, LLO4, LLO5,
3	Twenty Second Transit theodolite with accessories.	LLO9, LLO10, LLO11
4	Dumpy Level , Tilting Level ,Auto Level	LLO6, LLO7, LLO8,
5	Plane table	LLO12, LLO13

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	Overview and Classification of Surveying	CO1	08	2	4	2	08
2	II	Cross Staff and Compass Surveying	CO2	14	4	4	6	14
3	III	Theodolite Surveying	CO3	16	4	8	8	20
4	IV	Levelling and Contouring	CO4	16	4	8	8	20
5	V	Plane table Surveying	CO5	06	4	4	0	08
Grand Total				**60**	**18**	**28**	**24**	**70**

IX.ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
Two unit tests of 30 marks and an average of two	End semester assessment of 25 marks for

unit tests. For laboratory learning 50marks.	internal assessment. End semester assessment of 70 marks theory examination.

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	3	1	2	1	1	3	2	-	2
CO3	3	3	2	3	1	2	3	-	-	-
CO4	3	3	2	3	1	2	3	2	-	-
CO5	3	2	2	3	1	2	3	-	2	2

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

XI.SUGGESTED LEARNING MATERIALS/BOOKS

Sr. No	Author	Title	Publisher
1	T.P.Kanetkar ,S.V.Kuilkarni/Pune	Surveying and leveling part I and II	Vidyarthi gruh Prakashan,Pune
2	Dr. B. C. Punmia/	Surveying and Levelling Vol. I and II	Laxmi Publication
3	S. K. Husain, M. S. Nagaraj/	Text book of Surveying	S. Chand and Company
4	S. K. Duggal/	Surveying and Levelling Vol. I and II	Tata McGraw-Hill
5	Alak De	Plane Surveying	S Chand Publication
6	N. M. Basak	Surveying & Levelling	Tata McGraw-Hill

XIII. LEARNING WEBSITES & PORTALS

Sr. No	Link/Portal	Description
1	https://youtu.be/ZsajLQ4OiV8?list=PL20A0651466E8A776	NPTEL Lecture on Basic surveying
2	https://youtu.be/nq_wOpJs9zk?list=PL20A0651466E8A776	NPTEL Lecture on Measurement of distances Part II
3	https://youtu.be/nAk1YBc_FAk?list=PL20A0651466E8A776	NPTEL Lecture on Compass Surveying Part I
4	https://youtu.be/2EYQDwcizcE?list=PL20A0651466E8A776	NPTEL Lecture on Compass Surveying Part II

5	https://youtu.be/MhbU0qyYt48?list=PL20A0651466E8A7	NPTEL Lecture on Levelling Part I
6	https://youtu.be/Yi0cGAtxKtA?list=PL20A0651466E8A776	NPTEL Lecture on Levelling Part II
7	https://youtu.be/Muiiuzkq5jY?list=PL20A0651466E8A776	NPTEL Lecture on Levelling Part III
8	https://youtu.be/zADj0k0waFY	Videoclip on use of Polar planimeter for area measurement
9	https://youtu.be/W2V7-ZjgLys?list=PL20A0651466E8A776	NPTEL Lecture on Contouring Part I

Name & Signature:

Shri. S. S. Mude
Lecturer in Civil

Smt. B. N . Makam
Lecturer in Civil

(Course Experts)

Name & Signature:	Name & Signature:
Shri.V.G.Tambe (Programme Head)	**Shri.S.B.Kulkarni** (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	**DIPLOMA IN CE**
PROGRAMME CODE	**01**
COURSE TITLE	**Rural Engineering**
COURSE CODE	**CE21202**
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	
CE21202	Rural Engineering	SEC	0	0	2	2	4	2	0	0	0	0	0		25	10	-	-	25	10	50

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:

Rural Development is the process of improving the quality of life and economic well being of people living in rural areas. Rural Industrialization in the form of Cottage and Agro-based industries is vital for rural development. The content of this subject includes watershed management, Cottage and Agro-based industries, Rural infrastructure development and study of various government schemes etc. This will help the students to apply scientific knowledge in the process of sustainable development of village through optimum utilization of both natural / manmade resources. This course has been designed so that the diploma Civil Engineer is able to use this knowledge for development of rural areas to make the villages a better place to live in.

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

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

CO1 - Undertake the survey to decide the status of socio-economic significance.
CO2 – Identify the need of watershed management in rural areas.

CO3 - Suggest relevant government scheme for construction of roads, housing and energy conservation.
CO4 - Suggest the relevant cottage and agro based industries for the rural areas.
CO5 - Select the relevant schemes of Central / State Government for the rural areas.
CO6 - Apply the principles of rural development in rural areas.

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 Overview of Rural Development (CL Hrs-NIL, Marks- NIL)				
1.	TLO1.1 Suggest improvement required for the development of the given rural area. TLO1.2 Describe the social ,economic and political significance of rural development for the given area TLO1.3 Describe the procedure for socio-economic survey for the given village TLO1.4	1.1 Rural development: need, definition , objectives 1.2 Significance of rural development: Social significance, Economic significance 1.3 Panchayat Raj Institution Organizational set up : purposes, objectives , activities. 1.4 Socio economic survey 1.5 Role of Civil Engineer in Rural development.	Video Demonstrations Presentations Chalk-Board Flipped Classroom	**CO1**
Unit - II Water resources management and sanitation (CL Hrs- NIL, Marks- NIL)				
2.	TLO2.1 Select the relevant watershed management structure in the given site condition. TLO2.2 Describe the procedure of the construction of form pond in the given site conditions. TLO2.3 Draw the layout of given type of irrigation system showing its components parts for the given site conditions. TLO2.4 Use the relevant method of rainwater harvesting suiting to the given site conditions	2.1 Water shed management structure (K.T.weir,Garbian Structure, Cement plug,Contour Bunding, Farm pond,Underground bandhara) : Uses , Importance , Advantages and Disadvantages. 2.2 Rain water harvesting and Recharging of sources. 2.3 Layout and component parts of Drip Irrigation , Sprinkler Irrigation and Lift Irrigation. 2.4 Rural Water supply – Sources , low cost technique of treatment. 2.5 Rural sanitation – Low cost WC , readymade toilet , soak pit techniques for constructing WC requiring less quantity of water.	Video Demonstrations Presentations Chalk-Board Flipped Classroom	**CO2**

Unit - III Rural roads,housing and Energy (CL Hrs- NIL, Marks- NIL)				
3.	TLO3.1 Explain the criteria for allocation of house under Rural housing scheme for the given location. TLO3.2 Summarize the salient features of Pradhan mantri gram sadak yojna of Govt. of India. TLO3.3 Summarize the low cost housing Principles. TLO3.4 Identify the sources of renewable energy for the given site conditions.	3.1 Indira Awas Yojna – salient features , beneficially people 3.2 Pradhan mantri gram sadak yojna (PMGSY) – Key elements , concept of rural road connectivity 3.3 Low cost housing – Principles , purpose. 3.4 Renewable energy and integrated rural energy programme, Working of Gobar gas and Bio gas plant	Video Demonstrations Presentations Chalk-Board Flipped Classroom	**CO3**
Unit - IV Rural industry and Finance (CL Hrs- NIL, Marks- NIL)				
4.	TLO4.1 Justify the need of cottage Industry on the basis of given criteria for given rural area. TLO4.2 Classify the agro based industry based on the given criteria. TLO4.3 Identified the sources of funds for the development of the given rural area.	4.1 Cottage industry _ Brick manufacturing , concrete hollow block, Artificial sand stone crushing plant. 4.2 Agro based industry – Dairy , Animal husbandry. 4.3 Sources of funds for rural development –Domestic (Institutional and non Institutional) Foreign (Institutional and non Institutional)	Video Demonstrations Presentations Chalk-Board Flipped Classroom	**CO4**
Unit - V Government policies Pertaining to Rural development (CL Hrs- NIL, Marks- NIL)				
5.	TLO5.1 Government schemes of Rural development available for the given area TLO 5.2: Explain the salient feature of National Rural Employment Guarantee Act 2005 for the development of given area TLO 5.3: Describe the procedure mentioned in Prime Minister Rural Development Fellowes Scheme for the given rural area TLO 5.4: Execute the Deendayal Yojna.	5.1 Prime minister rural development fellowship scheme. 5.2 National rural employment guarantee act , 2005, NREGA 5.3 Swarnjayanti gram swaraj yojna 5.4 The Sampoorna Gramin Rozgar yojna 5.5 Deen Dayal Upadhaya yojna 5.6 Gramin Kaushalya Yojna	Video Demonstrations Presentations Chalk-Board Flipped Classroom	**CO5**
Unit -VI Planning for Rural Development (CL Hrs- NIL, Marks- NIL)				

6	TLO 6.1: Justify the necessity of planning for the development of the given rural area. TLO 6.2: Describe the methodology used for executing the block and District level planning for the given rural area.	6.1 Plan and planning for rural development. 6.2 Decentralization policy of Planning, Block and District Level Planning.	Video Demonstrations Presentations Chalk-Board Flipped Classroom	**CO6**

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

Sr. No	Practical/Tutorial/Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles /Tutorial Titles	Number of hrs.	Relevant COs
1	LLO 1.1 Socio-economic survey questionery	Prepare a Questioner for conducting socio-economic survey.	2	CO1
2	LLO 2.1 Undertake socio-economic survey	Undertake socio-economic survey of a small nearby village.	4	CO1
3	LLO 3.1 water shed management structures	Prepare the report on the field visit of any one structure built under water shed management system.	2	CO2
4	LLO 4.1 Rain water harvesting techniques	Prepare the report on the field visit for Rain water harvesting techniques for rural area.	2	CO2
5	LLO 5.1 Irrigation systems	Prepare the report on the field visit of Drip Irrigation , Sprinkler Irrigation and Lift Irrigation system.	4	CO2
6	LLO 6.1 Low cost housing	Prepare the report on the field visit for low cost housing for rural area.	2	CO2
7	LLO 7.1 Rural water supply and rural water sanitation	Prepare the report on the field visit for rural water supply and rural water sanitation technique.	4	CO2
8	LLO 8.1 Gobar gas/ Bio gas plant.	Prepare the report of site visit of working of Gobar gas/ Bio gas plant.	4	CO3
9	LLO 9.1 State/Central government schemes	Prepare the report of schemes of State/ Central government regarding village development.	2	CO4
10	LLO 10.1 Cottage industries	Prepare a report on cottage industries located in near by rural area.	4	CO5
11	LLO 11.1 Block and District level planning	Describe the methodology used for executing the block and District level planning for rural area.	2	CO6

Sr. No.	Performance Indicators	Weightage in %
1	Collection and Analysis of data	40

2	Preparation of report / drawing	30	
3	Interpretation of result and conclusion	10	
4	Answer sample questions	10	
5	Submission of report in time	10	
	Total	**100**	

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

Micro-project

a. Prepare a report on implementation of Prime Minister Rural Development fellows scheme for the nearby village after undertaking the visit to the village
b. Collect the detailed information on Pradhan mantri gram sadak yojna (PMGSY)
c. Summarize the salient features of the National rural Employment Guarantee act 2005 (NAREGA) that has been executed successfully for the given rural area and present the same in the form of report.
d. Collect the information of "Deen Dayal Upadhyaya Gramin Kaushalya Yojna" and prepare a report on it reference to the nearby village or rural settlement.
e. Visit to – Ralegan Siddhi / Hiware Bazar / Chitrakut,/ Vanrai and prepare a report on it .
f. Analyze the E book released by the Ministry of Rural Development downloaded through internet with special reference to its initiatives and achievements.

Assignment

NA

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr. No	Equipment Name with Broad Specifications	Relevant LLO Number
	NA	

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)
1. Termwork	1. Practical

X. SUGGESTED COS- POS MATRIX FORM

NOT APPLICABLE

XI.SUGGESTED LEARNING MATERIALS/BOOKS

Sr. No	Author	Title	Publisher
1	Desai ,Vasant	Rural development in India past , present and future : a challenge in the crisis	Himalaya publishing house Delhi ISBN 9788183181921 ISBN8183181929
2	Rastogi A. K.	Rural development strategy	Wide vision Jaipur ISBN 81-8068-000-2
3	Singh , Katar	Rural development principles, policies and Management	Sage Publications India Pvt Ltd ISBN-978-7829-929-6(PB)
4	Gaur , Keshav Dev	Dynamic of Rural Development	Mittal Publications , 1992 , Delhi ISBN 13- 978-8170993964 ISBN 81-7099-396-2
5	Govt. of India	Document published by Ministry of Rural development	Ministry of Rural Development
6	Dr. B. D. Sharma	Rural development & policies	9789381385418

XIII. LEARNING WEBSITES & PORTALS

Sr. No	Link/Portal	Description
1.	http://www.rural.nic.in	Official portal for ministry of rural development.
2.	http://www.panchayat.gov.in	Official portal for gram panchayat in India
3.	http://www.india.gov.in/topics/rura	National portal of India for rural development.

Name & Signature:

Smt.A.P.Shinde

Lecturer in Civil Engineering

(Course Experts)

Name & Signature:	Name & Signature:
Shri.V.G.Tambe (Programme Head)	**Shri.S.B.Kulkarni** (CDC In-charge)

GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

PROGRAMME	DIPLOMA IN CE/EE/ET/ME/MT/CM/IT/DDGM
PROGRAMME CODE	01/02/04/05/05/06/07/08
COURSE TITLE	YOUTH LEADERSHIP FOR CLIMATE ACTION
COURSE CODE	HU21202
PREREQUISITE COURSE CODE AND TITLE	NO

I. LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Course Type	Learning Scheme					Credits	Assessment Scheme											
			Actual Contact Hrs./Week			SLH	NLH		Paper Duration Hrs.	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	
HU21202	YOUTH LEADERSHIP FOR CLIMATE ACTION	VEC	-	-	-	2	2	1	-	-	-	-	-	-	-	-	-	50	20	50

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:

1. **FA-TH** represents an average of two class tests of 30 marks each conducted during the semester.
2. 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.
3. 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.
4. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
5. **1 credit** is equivalent to **30 Notional hours**.
6. * Self-learning hours shall not be reflected in the Timetable.

6.*Self-learning includes micro-projects/assignments/other activities.

II. RATIONALE:

Climate change is a global phenomenon that transcends borders. Climate change poses significant threats to biodiversity, ecosystems, and natural resources. Its impacts, such as rising temperatures, extreme weather events, and sea-level rise, affect communities worldwide. Addressing climate change is a collective responsibility to safeguard the planet and its ecosystems for current and future generations. Climate change exacerbates social and economic inequalities, affecting vulnerable communities disproportionately. With increasing climate risks, and exposure to hazards, citizens need to improve clean and green skills.

Mitigating climate change and taking climate action is essential for preserving the Earth's biodiversity, maintaining ecosystem services, and ensuring the sustainability of vital resources upon which human societies depend. By taking climate action, societies can enhance resilience, reduce vulnerability, and promote social and economic stability. Sustainable practices help protect, preserve, and sustain the environment, as well as stimulate economic growth in sectors such as renewable energy and energy efficiency.

Climate action involves transitioning to more sustainable and resource-efficient practices. This includes adopting clean energy sources, improving energy efficiency, and promoting circular economies. Imparting skills to the human resources in the clean and green sectors is also a climate action. Such measures not only mitigate climate change but also contribute to the efficient use of resources and the reduction of environmental degradation.

The national, state, and multilateral efforts, such as the Mission Life, State Climate Action Planning, Paris Agreement, etc. provide a framework for countries to work together in reducing greenhouse gas emissions, adapting to climate impacts, and fostering technology transfer for sustainable development.

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

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

CO1: Demonstrate a comprehensive understanding of the science behind climate change, its causes, and its impacts on the environment, economy and society.
CO2: Understand the principles of water resource management (WRM), water conservation and its application in the context of climate change.
CO3: Understand the relationship between climate change and waste management, including the issues and impacts of waste management practices on greenhouse gas emissions.
CO4: Demonstrate a comprehensive understanding of energy systems, including sources, distribution, and consumption patterns
CO5: Advocate for and implement energy conservation practices at individual, community, and organizational levels to reduce overall energy demand.
CO6: Develop a comprehensive understanding of the intricate interconnections between biodiversity and climate, and recognize the reciprocal impacts each has on the other.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Sr. No	Theory Learning Outcomes(TLO'S) aligned to COs.	Learning content mapped with TLOs.	Suggested Learning Pedagogies	Relevant COs
	UNIT-I LIVING WITH CLIMATE CHANGE			
	SUBUNIT 1: CLIMATE CHANGE PHENOMENON AND SCIENCE			
1.1	**TLO 1.1.1** Able to articulate the fundamental differences between weather and climate **TLO 1.1.2** Understanding of the basic principles of climate change, including the greenhouse effect, human-induced factors, and the consequences of a warming planet. **TLO 1.1.3** Able to define the concept of a carbon footprint, understanding it as the total amount of greenhouse gases.	1.1.1 Understanding Climate: Weather versus Climate 1.1.2 Climate and the Greenhouse Effect 1.1.3 Natural and Human-induced Climate Change 1.1.4 Carbon footprint	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	1
	SUB UNIT 2: CLIMATE CHANGE IMPACTS			
1.2	**TLO 1.2.1** Grasp the foundational science behind climate change, including the greenhouse effect, human-induced emissions, and the role of feedback mechanisms in global warming. **TLO 1.2.2** Identify and analyze key indicators of climate change, such as rising global temperatures, changing precipitation patterns, sea level rise, and the frequency of extreme weather events. **TLO 1.2.3** Understand the diverse climate patterns across India's biogeographic regions, including the Himalayas, Indo-Gangetic Plains, Western Ghats, Eastern Ghats, Deccan Plateau, and coastal regions.	1.2.1Global impacts and uncertainties 1.2.2 Effects on India and its various biogeographic regions 1.2.3Impacts on livelihoods and economy: Agriculture and Horticulture 1.2.4Impacts on Vulnerable Communities: Fishing Communities	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	1

SUB UNIT 3: CLIMATE ACTION				
1.3	**TLO1.3.1** Understand the concept of climate change mitigation and adaptation and its role in preparing for and responding to the impacts of climate change. **TLO1.3.2** Understand the concept of sustainable development and its three dimensions: economic, social, and environmental. **TLO1.3.3** Identify and articulate the connections between climate change impacts and existing social, economic, and environmental inequalities. **TLO1.3.4** Understand the importance of community-based climate action and initiatives led by local communities in India. **TLO 1.3.5** Understand the concepts of green skills and green work, emphasizing their role in promoting sustainability and environmentally conscious practices in various industries.	1.3.1 Mitigation and Adaptation 1.3.2 Intergovernmental processes 1.3.3 Sustainable Development Goals 1.3.4 Climate Justice 1.3.5 India's journey towards Climate Action 1.3.6 Majhi Vasundhara and Other Initiatives 1.3.7 Role of Individuals 1.3.8 Green Skills and Green Work	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	2
UNIT-II WATER MANAGEMENT FOR CLIMATE CHANGE				
SUB UNIT 1: THE NEED OF WATER MANAGEMENT AND CONSERVATION				
2.1	**TLO 2.1.1** Understand the concept of water management and its significance in addressing water-related challenges. **TLO 2.1.2** Describe the water cycle and its role in the distribution and availability of water. **TLO 2.1.3** Identify regions facing water scarcity and understand the factors contributing to water shortages. **TLO 2.1.4** Analyze patterns of human water consumption and its impact on local and global water resources. **TLO 2.1.5**Examine water quality issues, including pollution sources, contaminants, and their effects on ecosystems and human health. **TLO 2.1.6** Recognize the role of community engagement in water conservation efforts and sustainable water management practices. **TLO 2.1.7** Understand the	2.1.1 Water - the basis of life. 2.1.2 The water cycle and freshwater availability. 2.1.3 Water use in India and the importance of groundwater. 2.1.4 Water Resources in Maharashtra. 2.1.5 Use of water in our lives. 2.1.6 Virtual Water. 2.1.7 Traditions of water use and management. 2.1.8 Water Quality - an important dimension. 2.1.9 Wastewater: a problem and a potential resource.	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	2

	concept of wastewater and Identify and analyze the sources of pollutants in wastewater, including industrial discharges, agricultural runoff, and urban sewage.			
SUB UNIT 2: ISSUES AND CHALLENGES IN WATER MANAGEMENT				
2.2	**TLO 2.2.1** Understand the concept of water stress and its implications for a region's ability to meet water demand for various purposes. **TLO 2.2.2** Explore the role of agriculture in water stress, including irrigation practices, cropping patterns, and the impact of changing agricultural practices. **TLO 2.2.3** Understand the concept of water pollution and differentiate between various types of pollutants affecting water bodies. **TLO 2.2.4** Understand the environmental, ecological, and public health impacts of different pollutants in water, such as nutrients, heavy metals, pathogens, and synthetic chemicals. **TLO 2.2.5** Identify common waterborne diseases, such as cholera, typhoid, dysentery, and gastroenteritis, and understand their causative agents. **TLO 2.2.6** Define the challenges associated with inadequate sanitation, including issues related to open defecation, lack of access to sanitary facilities, and the impact on public health.	2.2.1 Water Stress in India. 2.2.2 Water resources limitation and increasing use. 2.2.3 Water stress in agriculture. 2.2.4 Water pollution and contamination. 2.2.5 Health impacts of poor water quality. 2.2.6 Water management and climate change. 2.2.7 The global challenge of water and sanitation. 2.2.8 Summary - causes of water stress.	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	2
SUB UNIT 3: TOWARDS SUSTAINABLE WATER MANAGEMENT				
2.3	**TLO 2.3.1** Understand and define the concept of sustainable water management, considering its ecological, social, and economic dimensions. **TLO 2.3.2** Understand the significant initiatives launched by the Government of India/State government which focuses on water resources and management.	2.3.1 Towards sustainable water management 2.3.2 Swachh Bharat - The Mission for a Clean India 2.3.3 Jal Jeevan Mission - Water for All 2.3.4 Atal Bhujal Yojana - Replenish Groundwater 2.3.5 Mission Amrit Sarovar - Rejuvenate Water bodies 2.3.6 Jalyukt Shivar Abhiyan – Waterscapes.	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	2

SUB UNIT 4: INDIVIDUAL AND COMMUNITY ACTIONS FOR WATER AND WASTEWATER MANAGEMENT				
2.4	**TLO 2.4.1** Understand the concept of a water audit and its significance in assessing water use, efficiency, and conservation. **TLO 2.4.2** Analyze water use patterns in common household activities, including bathing, washing dishes, laundry, and gardening. **TLO 2.4.3** Understand the definition of greywater and Recognize common sources of greywater in households, including bathroom sinks, showers, bathtubs, and washing machines. **TLO 2.4.4** promote awareness within communities about the benefits of greywater management and its potential impact on water conservation. **TLO 2.4.5** Understand the concept of rainwater harvesting and its significance in sustainable water management. **TLO 2.4.6** Learn different methods used to calculate rainwater harvesting potential	2.4.1 Conduct water audits 2.4.2 Save water at home 2.4.3 Promote greywater management at home and in the community 2.4.4 Spread the word on sustainable water management 2.4.5 Calculate Rainwater Harvesting Potential.		2
UNIT III: WASTE MANAGEMENT AND CLIMATE ACTION				
SUBUNIT 1: WHAT IS WASTE?				
3.1	**TLO 3.1.1** Understand the term "domestic waste" and distinguish it from other types of waste generated in different contexts. **TLO 3.1.2** Classify domestic waste into different categories such as organic waste, recyclables, hazardous waste, and non-recyclables. **TLO 3.1.3** Learn various methods used to quantify household waste, including direct measurement, sampling, and estimation techniques. **TLO 3.1.4** Identify specific waste patterns associated with different generations and lifestyles **TLO 3.1.5** Understand the Sustainable Development Goals (SDGs)	3.1.1 Define and enlist types of waste 3.1.2 List the components of domestic waste 3.1.3 Differentiate between biodegradable and non-biodegradable waste 3.1.4 Assess the quantum of waste generated at home 3.1.5 Changes in Waste generation over human generations 3.1.6 Review lifestyle choices 3.1.7 SDGs and Link of Waste with SDGs	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	3

	TLO 3.1.6 Analyze the critical role of waste management in achieving multiple SDGs			
SUBUNIT 2: ISSUES IN WASTE MANAGEMENT				
3.2	**TLO 3.2.1** Emphasizing waste impact on the environment, human health, and overall sustainability. **TLO 3.2.2** Identify health risks associated with improper waste disposal, such as the spread of diseases and exposure to hazardous materials. **TLO 3.2.3** Analyze how waste, particularly organic waste in landfills, contributes to greenhouse gas emissions and climate change.	3.2.1 Why is waste an issue? 3.2.2 Health impacts from mismanagement of waste 3.2.3 Work conditions of waste workers 3.2.4 Waste of natural resources and increased greenhouse gas emissions	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	3
SUBUNIT 3: APPROACHES TO WASTE MANAGEMENT				
3.3	**TLO 3.3.1** Clearly define the waste management hierarchy **TLO 3.3.2** Waste management hierarchy role in guiding sustainable waste management practices such as source reduction, reuse, recycling, energy recovery, and disposal.	3.3.1 Hierarchy of waste management 3.3.2 Waste segregation at source 3.3.3 Reduce, Reuse, Recycle and Recover 3.3.4 Recycling of waste materials 3.3.5 Principle of circular economy 3.3.6 Avoiding waste by design 3.3.7 Composting	Video Lectures (Online Mode: Link - https://www.mahayouthnet.in/)	3
SUBUNIT 4: LEGISLATIONS RELATED TO WASTE MANAGEMENT				
3.4	**TLO 3.4.1** Familiarize yourself with major national and international legislation related to waste management. **TLO 3.4.2** Define Extended Producer Responsibility (EPR) and explain its concept in the context of environmental management. **TLO 3.4.3** Define biomedical waste and distinguish it from other types of waste. Identify the various sources and types of biomedical waste generated in healthcare facilities.	4.1 Municipal Solid Waste Management Rules 2016 4.2 Plastic Waste Management Rules 4.3 Extended Producer Responsibility (EPR) 4.4 Biomedical Waste Management 4.5 Preventive Measures for Manual Scavenging	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	3
SUBUNIT 5: ACTION FOR IMPROVING WASTE MANAGEMENT				
3.5	**TLO 3.5.1** Develop skills in data collection methods for waste assessment, such as waste audits, surveys, and interviews.	5.1 Waste assessment in your community or town 5.2 Setting up a compost unit	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	3

	TLO 3.5.2 Analyze collected data to identify patterns, trends, and areas for improvement in waste management practices. **TLO 3.5.3** Define composting and explain the biological processes involved in the decomposition of organic matter. **TLO 3.5.4** Explore different composting methods, such as aerobic and anaerobic composting, and choose the most suitable technique for the compost unit. **TLO 3.5.5** Explore different biogas production technologies, such as continuous stirred tank reactors (CSTR) and anaerobic digesters.	5.3 Biogas: Is it a possibility?		
UNIT IV: ENERGY MANAGEMENT AND CLIMATE ACTION				
SUBUNIT 1: ENERGY IN OUR LIVES				
4.1	**TLO 4.1.1** Identify the key principles of efficient energy use and conservation. **TLO 4.1.2** Familiarize yourself with different energy sources, including renewable and non-renewable options. **TLO 4.1.3** Understand the connection between energy production, consumption, and climate change. **TLO 4.1.4** Understand India's commitments to sustainable energy at the national and international levels, including agreements	4.1.1 Energy and quality of life 4.1.2 Sources of energy 4.1.3 Energy and C Change 4.1.4 Judicious use of non-renewable energy resources 4.1.5 A Just Transition 4.1.7 India's commitment to sustainable energy 4.1.8 Policies and Programs for Energy Management 4.1.9 Clean Energy for Cooking	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	4

SUBUNIT 2: YOUTH ACTION TO IMPROVE ENERGY MANAGEMENT				
4.2	**TLO 4.2.1** Recognize the role of youth in driving positive change in energy management. **TLO 4.2.2** Understand how youth-led initiatives can influence energy policies, behaviours, and practices. **TLO 4.2.3** Identify and promote energy-efficient practices in daily life, schools, and communities.	4.1.1 Avoid energy wastage 4.2.2 Energy-efficient appliances 4.2.3 Renewable Energy-Specific Policies and Schemes 4.2.4 Low Carbon Lifestyles book	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	4
SUBUNIT 3: PROMOTE SUSTAINABLE ENERGY AT HOME, INSTITUTION AND IN THE COMMUNITY				
4.3	TLO 4.3.1 Identify and calculate energy requirements at the household level and enlist ways of efficient energy usage TLO 4.3.2 Identify opportunities for improving public energy use in their village or town TLO 4.3.3 Design surveys that effectively capture data on energy-efficient appliance availability and usage patterns. TLO 4.3.4 Identify and analyze emerging technologies within the energy sector that require specialized skills. TLO 4.3.5 Demonstrate the ability to map existing skills within the energy sector workforce. TLO 4.3.6 Analyze skill gaps and their implications for the industry.	4.3.1 Energy audit at home or institution 4.3.2 Energy saving opportunities 4.3.3 Energy access survey 4.3.4 Surveys of energy-efficient appliance availability and use 4.3.5 Survey of renewable energy use 4.3.6 Survey energy sector skilling opportunities 4.3.7 Share study findings with policymakers	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	5
UNIT V: BIODIVERSITY CONSERVATION AND CLIMATE ACTION				
SUBUNIT 1: BIODIVERSITY IN OUR LIVES				
5.1	**TLO 5.1.**1 Understand the concept of biodiversity and its components **TLO 5.1.2** Clearly define the concept of biocultural diversity, explaining the interconnectedness of biological diversity (biodiversity) and cultural diversity. **TLO 5.1.3** Clearly define the concept of human dependence on biodiversity, outlining the various ways in which humans rely on	**5.1.1** What is biodiversity? **5.1.2** What is Biocultural diversity? **5.1.3** Nature of Human Dependence on Biodiversity **5.1.4** Biodiversity resources in your landscape	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	6

	diverse ecosystems for survival and well-being. **TLO 5.1.4** Develop the ability to identify and categorize the various forms of biodiversity present in the specific landscape, including plants, animals, microorganisms, and their interactions.			
	SUBUNIT 2: THREATS TO BIODIVERSITY			
5.2	**TLO 5.2.1** Categorize and differentiate between natural and anthropogenic threats to biodiversity, including habitat loss, pollution, climate change, invasive species, and overexploitation. **TLO 5.2.2** Clearly define the concepts of biocultural diversity and climate change, highlighting the interconnectedness between biological diversity, cultural diversity, and changing climatic conditions.	**5.2.1 Threats to biodiversity** **2.2.2 Biocultural diversity and climate change**	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	6
	SUBUNIT 3: CONSERVING BIODIVERSITY			
5.3	**TLO 5.3.1** Clearly define the concept of biodiversity conservation, emphasizing its importance in maintaining ecological balance and supporting human well-being. **TLO 5.3.2** Explore the historical background that led to the development of forest acts, considering factors such as colonial influences, resource extraction, and changing societal attitudes towards forests. **TLO 5.3.3** Clearly define the concept of biodiversity conservation actions, emphasizing the multifaceted approaches and strategies employed to protect and sustain biodiversity.	**5.3.1** Approaches to conservation of biodiversity. **5.3.** Key legislations for biodiversity conservation **5.3.3** Actions for biodiversity conservation at various levels, including awareness raising and advocacy in the community	Video Lectures (Online Mode: Link https://www.mahayouthnet.in/)	6

Note: All above Units are Mandatory units. (In Online mode, only Units nos 1 and 2 are Mandatory and units nos 3,4, and 5 are Elective/optional)

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

NOT APPLICABLE

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

Table 01: Individual Activities

Sr. No	Unit Name	Activity	Activity Details
1	Living with Climate Change	Calculation of your carbon footprint online	To Calculate your carbon footprint online at https://www.unfccc.int/ https://www.carbonfootprint.com/ Use two carbon footprint calculators available online to Prepare your report for Carbon footprint. Compare the calculators used and suggest which is the better calculator with the reasons.
2	Water Management and Climate Action	Conducting water audits	To conduct a Personal-level water audit. 1. Track your overall water usage: a) Read your water meter, b) Estimate usage without a meter 2. Measure individual fixture flow rates: a) Faucet and showerhead flow b) Toilet flush: 3. Monitor your water habits: a) Keep a water use log b) Observe your routines 4. Analyze your findings: a) Compare your usage to benchmarks, b) Identify potential leaks c) Prioritize areas for improvement 5. Implement water-saving strategies: a) Install water-efficient fixtures b) Shorten showers and bath times c) Run appliances only when full d) Fix leaky faucets promptly e)Utilize alternative water sources
3	Waste Management and Climate Action	Surveying Home waste	To find out How much waste is generated in your home every day conduct a home survey for a weekAnalyze as per the following: a) What makes up the maximum part of the waste? b) How much of what was thrown out could have been reused or recycled? c) Could the amount of garbage be reduced? List the ways to reduce waste at home. Calculate: a) Waste generated over a week (in grams) divided by 7= waste (gms)/ day, b) Waste (gms)/ day divided by the number of persons in your house= Waste (gms)/ day/capita Using your survey results, you can calculate the approximate waste generated by the entire population of a block of flats, township, village, town, city, etc.
4	Energy Management and Climate Action	Preparation of Survey report on energy-efficient appliances.	To prepare a Survey report on energy-efficient appliances, their availability and use. 1. Availability of Energy-Efficient Appliances: 2. Use of Energy-Efficient Appliances 3. Government Policies and Incentives 4. Technological Advancements 5. Environmental Impact and Consumer Trends
5	Biodiversity Conservation and Climate Action	Preparation of a Survey report on Biodiversity resources in your landscape	To prepare a Survey report on Biodiversity resources in your landscape based on any one point among the list given below. 1. List of trees, plants, and shrubs in the village/ town outskirts, their classification, occurrence, and usage study. 2. Draw a biocultural map of the landscape of the village/ town, the diversity of trees (mother trees) and those who maintain it 3. A village called Tree: Understand a tree as an ecosystem and the biodiversity associated with the tree. 4. Ranmeva special study 5. Dietary diversity across three generations, a 'change over time' study.

Table 2: Group Activity

Sr. No.	Unit Name	Community Project Name	Activity Details
1.	Living with Climate Change	Conduction of Feasibility Study of Renewable Energy	Conduct a feasibility study on implementing renewable energy sources (such as solar, wind, or hydroelectric power) for a specific area or institution. Analyze costs, benefits, environmental impacts, and logistics involved in transitioning to renewable energy.
2.	Water Management and Climate Action	Preparation of water audit for the college campus.	To prepare a water audit for the college campus based on the following points 1. Gather Information: 2. Identify Water Use Areas: 3. Assess Indoor Water Usage: 4. Evaluate Outdoor Water Usage: 5. Measurements and Inspections: 6. Data Analysis: 7. Recommendations for Conservation: 8. Cost-Benefit Analysis: 9. Create an Action Plan: 10. Implementation and Monitoring: 11. Educational Outreach: 12. Documentation and Reporting:
3.	Waste Management and Climate Action	Conduction of survey on Waste assessment in your locality.	1. Conduct a survey of waste management systems in your town/ locality. Observe all the stages of waste management, and note who is involved at each stage viz. Waste collection Transport Processing in different ways Disposal etc. 2. Analysis of waste management in your /locality. 3. Assessment of Waste Segregation in your /locality.
4	Energy Management and Climate Action	Conduction of energy audit at home or Institute	To conduct an energy audit at home or Institute based on the following points. Analyze your findings based on the energy audit and suggest necessary actions to minimize energy consumption. 1. Gather information and Create a checklist about the following. **1. Lighting:** • Turn off lights in unoccupied rooms. • Replace incandescent bulbs with LEDs • Utilize natural light whenever possible **2. Heating and Cooling:** • Set your thermostat to energy-efficient temperatures (25°C in summer, 20°C in winter) • Seal air leaks around windows and doors. • Clean or replace air filters regularly. **3. Appliances:** • Unplug electronics and chargers when not in use. • Wash clothes and dishes in cold water whenever possible. • Use energy-efficient appliances when purchasing new ones **4. Insulation:** • Check your attic and basement for proper insulation. • Seal any gaps or cracks around pipes and vents. 5. Suggest corrective actions.

Sr. No.	Unit Name	Community Project Name	Activity Details
5.	Biodiversity Conservation and Climate Action	Preparation of report on Bio-Cultural Diversity Conservation	Prepare a report on Bio-Cultural Diversity Conservation. The report should include : **a) Introduction** i) What is biodiversity? ii)What is its importance in our life? iii) Connections of human beings with their nonliving surrounding and with living forms. **b) Biodiversity resources in your landscape -:** List of trees, plants, and shrubs in the village/ town outskirts, their classification, occurrence, and usage study. **c) Understand a tree as an ecosystem and the biodiversity associated with the tree.**

Note: (1) Individual activities:

The student should complete **any Three activities** among the list given in Table No. 01. above. **(Total Marks: 30 i.e. 10 Marks for each activity)**

(2) Group activity:

Students should complete **any One Community Project** among the list given in Table No. 02 above. **(Total Marks: 20)**

VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	NIL (SLA Course)	NIL

VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & AND ASSESSMENT PURPOSE

(Specification Table)

NOT APPLICABLE

IX. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)	Summative Assessment (Assessment of Learning)
Individual activities and group activities. (50 marks)	Online Examination and issue of online certificate. (Total 4 Certificates)

Note: Student will be awarded 1 credit only upon submission of certificates

i) One Certificate on combined completion of Units 1 and 2 and

ii) One Certificate each on completion of Units nos. 3,4, and 5.

A total of 4 Certificates are needed to be submitted which will be issued online along with the submission of Individual activities and Group activities.

X. SUGGESTED COs- POs MATRIX FORM

NOT APPLICABLE

XI. SUGGESTED LEARNING MATERIALS/BOOKS

Sr.No	Description	Mode	Remarks
1	Learning material.	Learning material is available in PDF form	Learning material is available for all units in PDF form at the institute website.

XII. LEARNING WEBSITES & PORTALS

Sr.No	Web Link /Portal	Description
1	(Online Mode: Link https://www.mahayouthnet.in/)	Learning material is available online in the course menu after registration for this online course for all units.

XIII. ROLE OF STUDENT AND FACULTY:

(a) ROLE OF STUDENT.

1. **i)Course Registration:** Students should register for this course by adopting the normal procedure for registration as applicable for other courses, as per the schedule declared in the academic calendar through his/her MIS login.

   ii) Online Registration: Online registration for this **Self-paced course "YOUTH LEADERSHIP FOR CLIMATE ACTION" in online mode by using the URL as under.**

   " URL for online registration: https://www.mahayouthnet.in/

   Students may join the course by scanning the QR Code as mentioned below.

(Important Note: Students must complete both actions "a" and "b" as mentioned above. Merely completing the registration process in the Institute MIS will not get the student registered for this course.)

2. Students should complete the **Module No. 01 and 02** of this course in online mode and complete the online assignments as available in the online module. Upon completion of these activities, the student will receive a certificate of completion for Units No. 1 and 2. (Will be generated Online from The portal)

3. Students should take up online **Module Nos. 03, 04 and 05 (which are available as "Elective Modules" in the same online module, No separate registration is needed for these modules)** and complete all unit-wise assignments as available in the online module. Upon completion of these activities, students will receive a separate certificate of completion for each unit i.e. **Units 03,04 and 05**) i.e. **three certificates.** (Will be generated Online from The portal)

4. Student must submit all 4 certificates (first certificate upon completing units nos. 1 and 2 and individual certificates upon completing units nos 3,4 and 5. A Total 4 certificates are needed to be submitted to the concerned faculty assigned for this course by the Concerned Head of the Department)

5. **Most Important Note regarding the award of 1 credit for this course: student must complete any 3 individual activities among the list of activities mentioned in table no 1 above AND must complete any 1 group activity AND submit all 4 certificates (generated in online mode upon completion of all 5 units in online study mode). Upon satisfying these conditions, the student will be awarded 1 credit for this course (SLA).**

7. **Detention/ Fail:**

The student shall be declared as "Detained" if he belongs to any of the following cases.

Case 1: If a candidate does not secure minimum passing marks in the SLA (Self Learning Assessment) course due to incomplete submission of assignments in offline mode despite producing 4 certificates from online mode, then the candidate shall be declared as "**Detained**" and will have to repeat and resubmit assignments in offline mode as SLA work in next semester.
Case 2: If a candidate does not submit 4 certificates from online mode though he/she has submitted all assignments in Offline mode, then the candidate shall be declared as "**Detained**" and will have to produce 4 certificates before the End-term Examination of the subsequent term.
Case 3: If a candidate fails to produce 4 certificates from online mode as well as fails to submit assignments in offline mode, then the candidate shall be declared as "**Detained**" and will have to repeat and resubmit assignments in offline mode as SLA work and he/she will be required to submit 4 certificates from the online mode in next semester.
Most Important Note: Students must complete any 3 individual activities among the list of activities AND must complete any 1 group activity AND submit all 4 certificates (generated in online mode upon completion of all 5 units in online study mode). Upon satisfying these conditions, the student will be awarded 1 credit for this course (SLA).

(b) ROLE OF FACULTY:

1. i) **Regarding confirmation of Course Registration:** Faculty should confirm that the course registration has been confirmed by the concerned registration in charge and HOD from their MIS login.

ii) **Online Registration for the course:** Faculty should confirm that the student has registered for the course in online mode by scanning the QR code OR through the link provided by the portal for registering for the **Self-paced course "YOUTH LEADERSHIP FOR CLIMATE ACTION"** in online mode. Faculty should collect screenshots from the students and maintain a record of such screenshots for the concerned semester/term.

2. **Regarding submissions to be accepted:** The faculty should ensure that the student has completed all 5 modules as mentioned above. The faculty should get the 4 certificates (per student) submitted as submission against completion of the online self-paced course **"YOUTH LEADERSHIP FOR CLIMATE ACTION"** during the term/semester for which, the student have registered. Also, the Faculty should accept the submissions from each student regarding the completion of the group activities as well as individual activities as mentioned above. This activity of submission must be completed before the last date of submission for other courses. ie before the provisional detention schedule as per the academic calendar for that term.

3. **Regarding SLA assessment and allocation of Marks:** Faculty should assess the submission with following guidelines.

i) Upon submission of online generated all 4 certificates (upon completion of online modules from the portal), the student should be considered eligible for the award of 1 credit along with satisfying the following conditions. (Faculty must not assess the individual activities and group activities if the student fails to submit all 4 certificates as proof of completion of the online course)

ii) Upon accepting the submission concerning individual activities and group activities, the assessment of these activities should be done by the faculty as per the assessment norms mentioned above in **"VI"** titled **"SUGGESTED MICROPROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)"**

iii) Faculty should preserve the record of student-wise allotted marks in the rubrics provided for SLA assessment.

iv) FACULTY should fill UP the marks of the student in the MIS mark sheet, only if the student has completed the online course (submitted all 4 certificates) and assessment of the group activities along with individual activities has been completed within the term schedule.

v) In case the student fails to complete " iv" above, the faculty should fill up the marks obtained by the student for the part-submission and fill up those marks in the MIS mark sheet.

Name & Signature:		
Shri. Nitin D. Toradmal Lecturer in Electronics Govt. Polytechnic, Pune	**Shri. Balaji Vharkat** UNICEF, Maharashtra	**Shri. Girish W. Sonone** Lecturer in Electronics Govt. Polytechnic, Mumbai
Name & Signature: **Shri. V.G.Tmabe** (Programme Head)	Name & Signature: **Shri.S.B.Kulkarni** (CDC In-charge)	