GOVERNMENT POLYTECHNIC MUMBAI

(Academically Autonoums Instititute, Government of Maharashtra)

Teaching and Examination Scheme(P19R)

With effect from AY 2019-20

Programme: Diploma in Information Technology (Sandwich Pattern) **Term / Semester - II**

Course Code	Course Title	Teaching Hours/Contact Hours				Credits	Examination Scheme (Marks)						
							Theory			PR	OR	TW	Total
		L	P	TU	Total		TH	TS1	TS2				
HU19R101	Business Communication	2	2		4	4	60	20	20			50	150
SC19R110	Engineering Mathematics	4			4	4	60	20	20				100
IT19R204	Digital Techniques	3	2		5	5	60	20	20	25		25	150
CO19R203	Computer Hardware andmaintenance		4		4	4				50*		50	100
IT192R05	Object Oriented Programmingusing C++ (MOOC)	2	4#		6	6							
CO19R204	Data structures	3	2		5	5	60	20	20	25*		25	150
IT19R301	Blender (MOOC)		2#		2#	2#							
UV19R102	Universal Human Values					2							
	Total	**14**	**16**		**30**	**32**	**240**	**80**	**80**	**125**		**125**	**650**
	Student Centered Activity(SCA)				**03**								
	Total Contact Hours				**33**								

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW- Term Work (progressive assessment)

* Indicates assessment by External Examiner else internal practical skill assessment, # indicates Self, on- line learning Mode, @ indicates on line examinationNote: Duration of Examination–TS1&TS2 -1 hour , TH- 2 hours, PR/OR – 3 hours per batch , SCA- Library -1 hour, Sports- 2hours, Creative Activity-2 hours

Self, on- line learning Mode through MOOCS/Spoken Tutorials /NPTEL/SWAYAM/NOSSEE etc.

Coordinator
Curriculum Development,
Department of Information Technology

Head of Department
Department of Information Technology

In-Charge
Curriculum Development Cell

Principal

Programme : Diploma in CE/ME/IT/CO/IS/EE/EC/LG/LT/RT (Sandwich Pattern)										
Course Code: HU19R105				**Course Title: Business Communication**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
TH	PR	TU	Total	TH (2 Hrs. 30 Min.)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
02	**02**	**-**	**04**	**60**	**20**	**20**	**-**	**-**	**50**	**150**

Abbreviations: TH- Theory; PR-Practical; TU-Tutorial; TS1 and TS2- Term Tests; OR-Oral Exam; TW: Term Work (progressive assessment); * Indicates assessment by External Examiner else internal assessment

Note: For Minimum passing marks under various heads, refer, examination rule AR26.

Rationale: Communication plays a vital and decisive role in career development. It is very important for the smooth functioning of any business or organization. Effective business communication is how employees & Management interact with each other to reach organizational goals & be more aligned with the core company / business values. This course introduces not only basic concepts of communication like types of communication, barriers in communication, group discussion, interview skills, presentation skills but also Business Correspondence which will well equip students to express themselves effectively in all forms of communication especially in written form. It will enhance the skills to communicate effectively and skillfully at workplace. It will guide and direct students to develop a good personality and improve communication skills.

Course Outcomes: Student should be able to

CO1	Apply proper communication technique to cope up with the challenges of the modern world.
CO2	Interpret feedback at various situations by using appropriate body language and avoid the barriers in effective communication.
CO3	Able to participate in Group Discussion and Acquire the practical knowledge of an interview.
CO4	Able to develop PowerPoint Presentation and Business correspondence.
CO5	Write letters, circulars, memos, notices, reports and communicate effectively in written communication.

Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction to Communication** 1.1 Elements of Communication 1.2 Communication Cycle 1.3 Types of communication 1.4 Definition and Types of Barriers- a)Mechanical b)Physical c)Language d)Psychological 1.5 Ways to overcome Barriers **Course Outcome: CO1 Teaching Hours :6 hrs Marks: 14 (R- 2, U-4, A-8)**
2	**Non- verbal Communication** 2.1 Meaning and Importance of Non-verbal Communication 2.2 Body Language 2.3 Aspects of Body Language 2.4 Graphic language **Course Outcome: CO2 Teaching Hours :6 hrs Marks: 12 (R- 4, U-4, A-4)**
3	**Group Discussion And Interview Skills** 3.1 Need and Importance of Group Discussion 3.2 Use of Knowledge and Logical sequence of ideas in Group Discussion 3.3 Types of Interview 3.4 Preparing for an Interview **Course Outcome: CO3 Teaching Hours :6 hrs Marks: 10 (R-2, U-4, A-4)**
4	**Presentation Skills** 4.1 Presentation Skills - Tips for effective presentation 4.2 Guidelines for developing PowerPoint presentation

	4.3 Business Etiquette **Course Outcome: CO4** **Teaching Hours: 4 hrs** **Marks: 08 (R- 2, U-2, A-4)**
5	**Business Correspondence** 5.1 Office Drafting – a) Notice b) Circular c) Memo d) Email-writing – Email etiquette, drafting formal / informal email 5.2 Personal Letter 5.3 Job Application with resume. 5.4 Business Letters – a) Enquiry b)Order c)Complaint 5.5 Report Writing – a) Fall in Production b) Accident Report **Course Outcome: CO5** **Teaching Hours: 8 hrs** **Marks: 16 (R- 4, U-4, A-8)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction to Communication	2	4	8	14
2	Non- verbal Communication	4	4	4	12
3	Group Discussion And Interview Skills	2	4	4	10
4	Presentation Skills	2	2	4	8
5	Business Correspondence	4	4	8	16
Total		**14**	**18**	**28**	**60**

List of Assignments :

Sr. No.	List of Experiments	COs	Hours
1	Listening Practice	CO1	03
2	Reading Practice	CO1	03
3	Writing Practice and E-Note	CO5	03
4	Communication Practice and Impromptu Communication.	CO4	03
5	Introduction to Vocabulary	CO5	03
6	Conversation between students on various situations.	CO2	03

7	Non- Verbal Communication.	CO2	03
8	Group Discussion	CO3	03
9	Mock Interview	CO3	03
10	Grammar • Tenses • Transformation of sentences • Articles • Subject Pronoun - Singular & Plural • Verbs	CO5	03
	Total		**30**

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

References / Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Communication Skills	Joyeeta Bhattacharya - Reliable Series	9780000176981, 0000176982
2	Communication Skills	Sanjay Kumar, PushpaLata- Oxford University Press	13: 978-0199488803
3	Successful presentation Skills	Andrew Brad bury- The Sunday Times	13: 9780749456627
4	Business Communication Using Computers	Dr.Yogesh T.Malshette Sonali Malshette Nirali Prakashan	

E-References:

1. Website: www.mindtools.com/page8.html-99k
2. Website:www.inc.com/guides/growth/23032.html-4
3. Website: www.khake.com/page66htm/-72k
4. https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-English
5. Website: www.letstak.co.in
6. https://infyspringboard.onwingspan.com/
7. http10s://learnenglishteens.britishcouncil.org/skills

CO Vs PO and CO Vs PSO Mapping (CIVIL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	2	3	2	—	2	—	—
CO2	1	2	2	2	2	3	2	—	2	—	—
CO3	2	2	2	2	2	3	2	—	2	—	—
CO4	2	3	2	2	2	3	2	—	2	—	—
CO5	1	1	2	2	3	3	3	—	2	—	—

CO Vs PO and CO Vs PSO Mapping (MECHANICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2	1	—	—	1	3	3	—	—
CO2	2	1	—	—	1	3	3	—	—
CO3	—	1	1	—	—	2	3	—	—
CO4	—	2	2	—	—	3	2	—	—
CO5	—	2	2	—	—	3	2	—	—

CO Vs PO and CO Vs PSO Mapping (ELECTRONICS ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	—	2	—
CO2	3	3	2	3	2	3	2	—	—	2
CO3	3	2	2	1	2	3	2	—	2	—
CO4	3	3	2	1	2	3	2	—	—	—
CO5	3	3	2	1	2	3	2	—	—	—

CO Vs PO and CO Vs PSO Mapping (ELECTRICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	1	2	2
CO2	3	3	2	3	2	3	2	2	2	2
CO3	3	2	2	1	2	3	2	—	1	1

CO4	3	3	2	1	2	3	2	1	3	3
CO5	3	3	2	1	2	3	2	2	2	2

CO Vs PO and CO Vs PSO Mapping (INSTRUMENTATION ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	1	1	1	—	2	2	1	1	1
CO2	1	1	1	—	2	2	1	1	1
CO3	1	1	1	—	2	2	2	1	1
CO4	1	1	1	—	2	2	2	1	1
CO5	1	1	1	—	2	2	2	1	1

CO Vs PO and CO Vs PSO Mapping (COMPUTER ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	1	2	1
CO2	3	3	2	3	2	3	2	1	2	1
CO3	3	2	2	1	2	3	2	1	2	1
CO4	3	3	2	1	2	3	2	—	2	—
CO5	3	3	2	1	2	3	2	—	2	—

CO Vs PO and CO Vs PSO Mapping (INFORMATION TECHNOLOGY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	2	2	2
CO2	3	3	2	3	2	3	2	1	1	1
CO3	3	2	2	1	2	3	2	1	2	2
CO4	3	3	2	1	2	3	2	2	2	1
CO5	3	3	2	1	2	3	2	1	2	1

CO Vs PO and CO Vs PSO Mapping (LG/LT ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	1	---	2
CO2	3	3	2	3	2	3	2	1	---	2
CO3	3	2	2	1	2	3	2	1	1	2
CO4	3	3	2	1	2	3	2	1	---	2
CO5	3	3	2	1	2	3	2	1	---	2

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Neelamkumar R. Sawant	State Head, Technical Services	JSW Cement ltd. Mumbai Head Office
2	Shri. Ritesh Bharambe	Manager-Sales	JAI Instruments and Systems Pvt.Ltd
3	Shri. Aniket Mhala	Global Head – Technology & Innovation Hub	Oracle financial services and software
4	Mrs. S. S. Kulkarni	Lecturer in English	Government Polytechnic Pune
5	Mrs. K.S.Pawar	Lecturer in English	Government polytechnic Mumbai
6	Ms. N. N. Dhake	Lecturer in English	Government polytechnic Mumbai

Coordinator, Ms N N Dhake
Curriculum Development,
Department of Science And Humanities

Ms. K.S. Pawar
Head of Departments
Department of Science And Humanities

I/C, Curriculum Development Cell

Principal
Government Polytechnic Mumbai

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CDC Co-ordinator
G. P. Mumbai

Programme : **Diploma in CE/ME/CO/IF/EC/EE/IS(Sandwich Pattern)**										
Course Code: **SC19R110**				Course Title: **ENGINEERING MATHEMATICS**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30 Min.)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
4	**--**	**--**	**4**	**60**	**20**	**20**	**--**	**--**	**--**	**100**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR- Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill tests are to be conducted. First skill test at midterm and second skill test at the end of the term

Rationale:

This subject is kept under the branch of sciences. This subject intends to teach student basic facts ,concepts, principles, and procedure of mathematics as a tool to analyze engineering problems and as such lays down foundation for understanding the engineering and core technology subject.

Course Outcomes: Student should be able to

CO1	Define the basic principles of function, limits, derivatives; complex number and relations between two-variables.
CO2	Apply rules, concept and properties to solve the problems
CO3	Solve the given problems of integration using suitable method.

Course Content Details:

Unit No	Topics / Sub-topics
1	**1. Function** Definition of variable,constant,intervals such as open,closed,semi-open etc Definition of function,value of function and types of functions and simple examples **Course Outcome: CO1 Teaching Hours : 10 hrs Marks: 10 (R- 4, U-4, A-2)**
2	**2. Limits** Definition of neighbourhood,concept and definiton of limit Limits of Algebraic function Limits of Trigonometric Functions with simple examples **Course Outcome: CO1 Teaching Hours : 10 hrs Marks: 10 (R- 2 , U-4 , A-4)**
3	**3. Derivatives & Application of derivative** Definition of the derivative. Derivatives of standard function.(No proof by first principle) Differentiation of sum, difference, product and quotient of two or more functions Differentiation of composite function with simple example. Second order derivative. Geometrical Meaning of Derivative Tangents & Normals to the curve, Maxima & minima of the function Radius of curvature **Course Outcome: CO2 Teaching Hours : 10 hrs Marks:10 (R-4 , U- 4 , A-2)**
4	**4. Integration & Application of integration** Definition of integration as antiderivative ,Integration of standard function Rules of integration(Integration of sum, difference,scalar multiplication) without proof Integration by substitution Integration of composite function Definiton of definite integral Properties of definite integral with simple problems Area under the curve Area bounded by two curves **Course Outcome: CO3 Teaching Hours :10 hrs Marks:10 (R-4, U- 4 , A-2)**
5	**5. Complex Number:-** Definition of complex number Cartesian ,Polar ,Exponential form of complex number Algebra of complex number :-Equality , addition ,Substraction ,Multiplication & Division with simple examples **Course Outcome: CO2 Teaching Hours :10hrs Marks:10 (R- 2 , U-4 , A-4)**
6	**6. Numerical Analysis** Solution of Algebraic equations using – i) Bisectional method ii) Regular – Falsi method , iii) Newton- Raphson method 6.2 Solution of simultaneous equation (i) Gauss elimination method (ii) Jacobi's method (iii) Gauss-Seidal method **Course Outcome: CO2 Teaching Hours : 10 hrs Marks: 10 (R- 2 , U- 4 , A- 4)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Function	04	04	02	10
2	Limits	02	04	04	10
3	Derivatives & Application of Derivatives	04	04	02	10
4	Integration & Application of Integration	04	04	02	10
5	Complex Number	02	04	04	10
6	Numerical Analysis	02	04	04	10
	Total	18	24	18	60

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Mathematics for Polytechnic Students	S.P.Deshpande, Pune Vidyavardhini Graha Prakashan	-
2	Mathematics for Polytechnic Students (Volume I)	H.K.Dass, S.Chand Prakashan	9788121935241
3	Companions to Basic Maths	G.V.Kumbhojkar, Phadke Prakashan	10-B07951HJDQ 13-B07951HJDQ
4	Applied Mathematics	N.Raghvendra Bhatt late, Tata McGraw Hill Publication Shri R Mohan Singh	9789339219567, 9339219562

E-References:

1. www.math-magic.com
2. www.Scilab.org/-SCI Lab
3. www.mathworks.com/Products/Matlab/-MATLAB
4. www.wolfram.com/mathematica/-Mathematica
5. https://www.khanaacademy.org/math?gclid=CNqHuabCys4CFdoJaAoddHoPig
6. www.dplot.com/-Dplot
7. www.allmathcad.com/-Math CAD
8. www.easycalculation.com
9. https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-maths
10. MYCBSEGUIDE

CO Vs PO and CO Vs PSO Mapping (CIVIL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1	1		1
CO2	3			1			1	1		1
CO3	3			1			1	1		1

CO Vs PO and CO Vs PSO Mapping (MECHANICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3			1			1	1	
CO2	3			1			1	1	
CO3	3			1			1	1	

CO Vs PO and CO Vs PSO Mapping (COMPUTER ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1	1	1	
CO2	3			1			1	1	1	
CO3	3			1			1	1	1	

CO Vs PO and CO Vs PSO Mapping (INFORMATION TECHNOLOGY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1	1		1
CO2	3			1			1	1		1
CO3	3			1			1	1		1

CO Vs PO and CO Vs PSO Mapping (ELCTRONICS ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1		1	1
CO2	3			1			1		1	1
CO3	3			1			1		1	1

CO Vs PO and CO Vs PSO Mapping (ELECTRICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1		1	
CO2	3			1			1		1	
CO3	3			1			1		1	

CO Vs PO and CO Vs PSO Mapping (INSTRUMENTATION ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3			1			1	1	1
CO2	3			1			1	1	1
CO3	3			1			1	1	1

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Neelamkumar R. Sawant	State Head Technical Services for (Maharashtra and Goa)	JSW Cement ltd. Mumbai -Head Office
2	Mrs. Deepawali S. kaware	Lecturer in Mathematics	Government polytechnic Vikaramgad
3	Mr. A.S.Patil	Lecturer in Mathematics	Government polytechnic Mumbai
4	Mr.V.S.Patil	Lecturer in Mathematics	Government polytechnic Mumbai

GOVERNMENT POLYTECHNIC MUMBAI ESTD. 1960 KNOWLEDGE IS WEALTH

A.S.Patil V.S.Patil

Coordinator,
Curriculum Development,
Department of Sci. & Humanities

Head of Departments
Department of Science & Humanities

I/C, Curriculum Development Cell

Principal

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CDC Co-ordinator
G. P. Mumbai

Programme : **Diploma in Information Technology and Computer Engineering (Sandwich Pattern)**										
Course Code: **IT19R204**				Course Title: **Digital Techniques**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30min)	TS1 (1Hr)	TS2 (1Hr)	PR	OR	TW	Total
3	**2**	**--**	**5**	**60**	**20**	**20**	**25**	**---**	**25**	**150**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination

Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill tests are to be conducted. First skill test at midterm and second skill test at the end of the term

Rationale:

This course forms the foundation of computers. This course is introduced with the view that students will become familiar with various digital devices and circuits that are used in microprocessor, microcontroller, computers and other digital systems. It will enable the students to assemble, design, and test logical circuits like multiplexer, demultiplexer, counters, registers etc. This course covers the number systems, logic gates, combinational & sequential logic circuits, analog to digital and digital to analog converters which are important parts of digital systems.

Course Outcomes: Student should be able to

CO1	Perform binary, BCD arithmetic, number conversions and code conversions.
CO2	Understand different logic gates, their symbols, truth tables and pin configuration
CO3	Simplify Boolean expressions using Boolean laws, K map and realize them using logic gates.
CO4	Design various combinational and sequential circuits
CO5	Understand analog, digital signals and their conversions ADC and DAC

Course Content Details:

Unit No	Topics / Sub-topics
1	**Number Systems and codes** Introduction to digital signal, Difference between analog signal and digital signal, Advantages of digital systems over analog systems, positive and negative logic Concept of base of number system Decimal number system Binary number system, Octal number system Hexadecimal number system Conversion of one number system to another number system (fractional point numbers) Types of codes : BCD, Excess 3, Gray code Conversion of Binary to Gray and Gray to Binary

	Course Outcome: CO1, CO5 **Teaching Hours :4 hrs**	**Marks: 6 (R- 0, U-2, A-4)**
2	**Binary Arithmetic** Rules for Binary addition and subtraction Concept of 1's and 2's complement of a binary number Binary subtraction using 2's complement Signed and unsigned binary numbers BCD addition and BCD subtraction using 9's & 10's complement (Numericals based on above topic) Parity, Definition of even and odd parity **Course Outcome: CO1** **Teaching Hours :4 hrs**	**Marks: 6 (R- 2, U-2, A-2)**
3	**Logic Gates:** Basic Gates (AND, OR, NOT): circuit of basic gates using discrete components, symbol, truth table, logical expression Derived gates (EX-OR, EX-NOR): symbol, truth table and logical expression Universal gates (NAND, NOR) : symbol, truth table and logical expression, derivingall gates using universal gates **Course Outcome: CO2** **Teaching Hours :4 hrs**	**Marks: 6 (R- 2, U-2, A-2)**
4	**Boolean Algebra:** Boolean laws, De Morgan's theorems. Simplification of Boolean expression using Boolean laws and De Morgan's theorems. Construction of logic circuits using logic gates for Boolean expression Concept of SOP & POS, Minterm & Maxterm Karnaugh map (K-map) representation of logic function Simplification of K-map for 2, 3 and 4 variables with don't care condition Realization of reduced expression using logic gates. **Course Outcome: CO3** **Teaching Hours :6 hrs**	**Marks: 8 (R- 0, U-2, A-6)**
5	**Combinational Circuits:** Design of Half adder and full adder using K-map and realization using gates Design of Half subtractor and full subtractor using k-map and realization using gates 4 bit parallel binary adder (IC7483) Code converter using K-map: Binary to Gray code and Gray code to binary (upto 4bit) BCD to seven segment decoder/driver (IC 7447 and IC 7448) Comparator: 1 bit, 2 bit (design using K-map and realization using logic gates), 4 bit comparator using IC 7485 Multiplexer: Necessity of multiplexing, Principle of multiplexing, types of multiplexing 2:1, 4:1, 8:1 and 16:1, multiplexer tree Demultiplexer: Necessity of demultiplexing, Principle of demultiplexing, types of demultiplexing 1:2, 1:4, 1:8 and 1:16, demultiplexer tree, concept of decoder **Course Outcome: CO4** **Teaching Hours :11 hrs**	**Marks: 14 (R- 2, U-4, A-8)**

6	**Sequential circuits** Difference between combinational and sequential circuits Basic concept of Flip-flop Types of flip flop: SR, JK, D and T flip flops, circuit of SR FF using transistors. Truth table, symbol and operation of all FFs Concept of preset and clear inputs Race around condition in JK FF, Master slave JK FF Triggering methods: Edge trigger and level trigger Excitation table of SR, JK, D and T FF Counters: basic concept of counters, classification (synchronous and asynchronous counter), concept of Up and Down counter, Modulus of counter(MOD N counter) a. Design of asynchronous up and down counter (3/4 bit) and their timing diagram b. Design of synchronous up and down counter (only 3bits) Shift Registers: Definition, classification (SISO, SIPO, PISO, PIPO), their circuit diagram and working, Universal shift register, bidirectional shift register, Ring counter, Twisted ring counter (circuit and timing diagrams) **Course Outcome: CO4 Teaching Hours :12 hrs Marks: 14 (R- 2, U-4, A-8)**
7	**Data Converters** Need of data conversion Types of data converters ADC and DAC and their specifications Circuit diagram and working of R-2R ladder type DAC (mathematical derivation) Successive approximation and Ramp type ADC (their block diagram and working) **Course Outcome: CO5 Teaching Hours :4 hrs Marks: 6 (R- 2, U-4, A-0)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	**Number Systems and codes**		02	04	06
2	**Binary Arithmetic**	02	02	02	06
3	**Logic Gates**	02	02	02	06
4	**Boolean Algebra**		02	06	08
5	**Combinational Circuits**	02	04	08	14
6	**Sequential circuits**	02	04	08	14
7	**Data Converters**	02	04		06
	Total	**10**	**20**	**30**	**60**

List of experiments: Total 10 experiments (or turns) out of 15 experiments (or turns)

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	3	CO2 CO5	To verify Truth Table of basic gates AND, OR, NOT using ICS.	02
2	4	CO3	To implement given Boolean expression using logic gates.	02
3	5	CO4	To construct Half Adder and Half subtractor & verify the Truth Table	02
4	1, 5	CO1 CO4	To construct binary to gray code converter using gates and verify truth table.	02
5	3	CO2	To verify Truth Table of NAND, NOR, Ex-OR, Ex-NOR gates using ICS.	02
6	4	CO3	To verify De Morgan's theorems	02
7	5	CO4	To construct Full Adder verify the Truth Table	02
8	1, 5	CO1 CO4	To construct gray code to binary code converter using gates and verify truth table.	02
9	3	CO2	To implement basic logic gates using only NAND gates.	02
10	3	CO2	To implement basic logic gates using only NOR gates.	02
11	5	CO4	To construct Full subtractor & verify the Truth table	02
12	6	CO4	To verify truth table of SR and JK FF using ICs.	02
13	6	CO4	To verify truth table of D and T FF using ICs.	02
14	6	CO4	To construct 3 bit ripple counter using Flip Flop and verify its operation	02
15	6	CO4	To construct and test MOD-6 asynchronous counter using IC 7490.	02

Note: Experiments No. 1 to 5 are compulsory. Remaining 5 experiments should be performed as per the importance of the topic.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Modern Digital Electronics	R. P. Jain, Tata McGraw Hill, Education, Fourth Edition, 2009	978-0070669116
2	Digital Principles and Applications	Malvino A. P. and Leach, Tata McGraw Hill, Education, Seventh Edition, 2011	978-0070141704
3	Digital Electronics: an introduction to theory and practice	William Gothmann, Prentice Hall, Second Edition, 1982	0132122170

E-References:

1. www.electronics-tutorials.ws
2. www.wisc-online.com/learn/technical/electronics-digital
3. www.electricaltechnology.org
4. www.vlab.co.in

CO Vs PO and CO Vs PSO Mapping (Information Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	1				1	2	
CO2	3	3	3	3	1		1	1	3	
CO3	3	3	3	3					2	
CO4	3	3	3	3	3	2	2	2	3	3
CO5	3	1							2	

CO Vs PO and CO Vs PSO Mapping (Computer Engineering)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	1				1	2	
CO2	3	3	3	3	1		1	1	2	
CO3	3	3	3	3					3	
CO4	3	3	3	3	3	2	2	2	3	3
CO5	3	1							2	1

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4	Dr. R. A. Patil (Curriculum Content Designer)	Lecturer in Electronics	Govt. Polytechnic Mumbai

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Head of Department
Department of Information Technology

I/C, Curriculum Development Cell

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Programme: **Diploma in Computer Engineering and Information Technology (Sandwich Pattern)**										
Course Code: **CO19R203**				Course Title: **Computer Hardware and Maintenance**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs) 30 Mins	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
--	04	--	04	--	--	--	50*	--	50	100

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

Rationale:

It is hard to imagine our lives without computers. For most of us, the days are few and far between when we do not use our computers to pay bills, play games, surf the internet. Most people need computers to get their professional work done as well. Since computers are such an integral part of our lives, it is crucial that we take care of them by having them properly maintained.

Diploma students must be able to use and maintain computer system and its peripherals. This course will help them know computer hardware basics and to develop basic skills such as assembling PC and troubleshooting its peripherals.

Course Outcomes: Student will be able to

CO1	Identify various types of computer systems with its components and peripherals.
CO2	Demonstrate BIOS settings.
CO3	Partition Hard Disk Drive.
CO4	Troubleshoot common hardware problems.
CO5	Install various operating systems and basic softwares.

Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction to Computer Hardware and Devices:-** Desktop Computers, Laptops, Tablets, Mainframe computers, Supercomputers. Features Descriptions:- Hardware components of desktop system, laptop and tablet. Types of Servers, Server features, description and its applications. **Course Outcome: CO1**
2	**Motherboard:-** Components, Layout and Connections. Types and features of motherboard. Enhancing features of motherboard:- adding and replacing components. Troubleshooting problems of motherboard. **Course outcome:CO1CO4**
3	**CPU, BIOS and Power Supply** Processor basic features, Types of Processors,Cache,System Bus. BIOS:- Basic input output system services, BIOS interaction, Date and Time, Password Security, Boot Device Priority. Installing OS. SMPS and UPS importance. **Course Outcome:CO1 CO2 CO5**
4	**Hard Disk Drive:-** Hard Disk Interface:- EIDE, Serial ATA, SCSI, USB and IEEE 1394 (Firewire), RAID, Solid State Drives. Disk Structure:- Head, Tractor, Sector, Cylinders, Cluster, Landing Zone, MBR, Zone Bit Recording. Disk Performance Parameters Characteristics:- Disk access time ,seek and latency time, Data transfer rate. File System:- FAT 16, FAT32, NTFS, RAID Troubleshoot Hard Disk problems. **Course Outcome: CO1CO3**

5	**I/O Devices:-** StudyKeyboard, Mouse, Scanner, Monitor, Printer, Speaker & Mike, LCD Projetor. I/O cables :- Specification of I/O cables, Types of I/O cables, Types of I/O Ports. Use of Polycom Soundstation IP. Learn various Preventive Maintenance Techniques. **Course Outcome: CO1**

Suggested Specifications Table (Theory): NA

List of experiments:Total 10-12 experiments(or turns) out of 15-16 experiments(or turns)

Sr. No.	Unit No	CO	Experiments/ Laboratory Activities	Hours
1.	1	CO1	Identify type of desktop and laptop and verify its specifications.	4
2.	2	CO1	Identify various components located on motherboard.	4
3.	3	CO2	Configure BIOS settings.	4
4.	4	CO3	Partitioning of HardDisk.	4
5.	4	CO3	Format HardDisk Drive with various file systems.	6
6.	5	CO1	Connect Keyboard, Mouse, Monitor, Speaker, Microphone.	6
7.	5	CO1	Set LCD Projector.	4
8.	4	CO4	Troubleshoot Hard Disk problems.	6
9.	3	CO5	Install Operating System Windows Family.	4
10.	3	CO5	Install Operating System- Linux	4
11.	3	CO5	Installation of basic software's (Such as MS-Office).	4
12.	3	CO4	Test SMPS.	4
13.	5	CO4	Undertake preventive maintenance by using tools like blower,vacuum cleaner.	6
14.	5	CO1	Case Study:Understand use of Polycom soundstation IP.	4
			Total	64

E-References:

1. https://computer.howstuffworks.com/computer-hardware-channel.htm
2. https://www.youtube.com/results?search_query=how+to+test
3. https://edu.gcfglobal.org/en/subjects/basic-skills/

CO vs.PO and CO vs. PSO Mapping(Computer Engineering)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	2	2	2	1	2	3	2	1
CO2	1	2	3	2	2	1	2	3	3	3
CO3	1	2	2	3	2	1	2	2	2	2
CO4	1	2	2	3	2	1	2	3	3	3
CO5	1	2	3	2	2	1	2	3	3	3

CO vs.PO and CO vs. PSO Mapping (Information Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	2	2	2	1	2	2	2	3
CO2	1	2	3	2	2	1	2	3	3	3
CO3	1	2	2	3	2	1	2	3	3	3
CO4	1	2	2	3	2	1	2	3	3	3
CO5	1	2	3	2	2	1	2	3	3	3

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Head of Department
Department of Computer Engineering

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Programme : **Diploma in Computer Engineering and Information Technology (Sandwich Pattern)**										
Course Code:**CO19R204**				Course Title: **Data Structures**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs30m in)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
3	**2**	**--**	**5**	**60**	**20**	**20**	**25***	**---**	**25**	**150**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

Rationale:

The study of Data Structure is essential is essential part of Computer Science. Data structure is a logical and mathematical model for storing and organizing data in a particular way in a computer. The study of data structure helps the students in developing logic and structured programs

Course Outcomes: Student should be able to

CO1	Demonstrate the different data structures.
CO2	Use Stack and recursion concept.
CO3	Implement the Queue concept .
CO4	Use Linked List ,Tree and Graph Concept, Blockchain ,concepts.
CO5	Implement different Searching and Sorting Techniques.

Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction to Data Structures:** Need of data structures. Definition of Data structure and Abstract data type. Classification of Data structures: Linear, non-linear, homogeneous, non-homogeneous, static & dynamic. **Course Outcome: CO1Teaching Hours :6 hrs Marks: 08(R- 02, U-4, A-02)**
2	**Linked List** Introduction and Terminologies :Node, Next Address and Pointer, Null pointer, Emptylist Types of Linked List: Single Linked List, Doubly Linked List, Circular Linked List Doubly Circular Linked List Operations on Single Linked List:

	Searching, Insertion - (At Front ,In between and At End), Deletion - (From Front ,In between, From End) 2.4 Blockchain data structure:Introduction to Blockchain, Applications of Blockchain **Course Outcome:CO4 Teaching Hours :10 Marks: 12 (R- 02 , U- 04 , A- 06)**
3	**Stacks** Definition & examples of Stack, Stack as an abstract data type Implementations usingarrays and dynamic memory allocation Operations on Stack PUSH POP Top Of The Stack Overflow & Underflow of Stack Applications of Stack Polish Notation Reversing a List Recursion **Course Outcome: CO2 Teaching Hours : 08 Marks: 08 (R- 02 , U- 04 , A- 02)**
4	**Queue** Definition & examples of Queue Queue as an abstract datatype implementationsusing arrays and dynamic memory allocation Operations on Queue Types of Queue Priority queue Circular queue Application Of Queue Job Scheduling Task Scheduling **Course Outcome:CO3 Teaching Hours :08 Marks: 08 (R- 02 , U- 02 , A- 04)**
5	**Trees and Graphs** Introduction and Terminologies : Sub-tree, root ,leaf , left, non-leaf, right, parent, child, ancestor, descendant, brother, level, depth, height. Types of Tree General Tree Binary Tree Binary Search Tree Representation of Tree Operations on Trees Insertion Deletion

	Searching - Depth-first search and Breadth-first search Traversing - Pre-order, In-order ,Post-order Introduction to GRAPHS Terminologies: graph, node (Vertices), arcs (edge), directed graph, in-degree, out-degree, adjacent, successor, predecessor, relation, weight, path, length. **Course Outcome: CO4 Teaching Hours :10 Marks: 12 (R- 02 , U- 04 , A- 06)**
6	**Searching and Sorting** Searching Linear Search, Binary Search , Hash Search. Sorting Bubble Sort Insertion Sort Selection Sort Merge Sort Quick Sort **Course Outcome: CO5 Teaching Hours :08 Marks: 12 (R- 02 , U- 04 , A- 06)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction to Data Structures	02	04	02	08
2	Linked List	02	04	06	12
3	Stack	02	04	02	08
4	Queue	02	02	04	08
5	Trees and Graphs	02	04	06	12
6	Searching and Sorting	02	04	06	12
	Total	12	22	26	60

List of experiments: Total 10 experiments(or turns) out of 15 experiments(or turns)

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1	CO1	Write a program for insertion and deletion of an element in an Array at given position.	02
2	2	CO4	Write a program to implement following operations on Singly Linked Lista)Create b)Insertion c)Deletion	02
3	3	CO4	Write a program to implement following operations on Doubly Linked Lista)Create b)Insertion c)Deletion	02
4	4	CO4	In a "Suryan" Shopy multiple Items are available for selling , the store wants to automate the billing system so that the customer gets printed bill .Each Item has unique Id, name and its rate associated with it. Write a menu driven program which will ask the customer to select the Items and quantity of the Items and will generate bill in following format.	02
			Sr.no | Items | Rate | Quantity	
			Grand Total	
5	5	CO2	Write a program to implement the PUSH and POP operation of Stack	02
6	6	CO2	Write a program to implement the do and undo activity using Stack	02
7	1	CO2	Write a program to implement Infix Prefix and Postfix Operation	02
8	2	CO3	Write a program to implement different operations on Queue.	02
9	3	CO3	Write a program to implement the concept of Doubly ended Queue.	02
10	4	CO4	Write a program to implement Ticket Reservation of system which is based on following priorities VIP=5,Senior =4,Handicap=3,Ladies=2,General =1	02
11	5	CO4	Write a program to insert and delete nodes in a Tree.	02
12	6	CO4	Write a program to implement Inorder Preorder and Postorder of Tree nodes	02
13	5	CO5	Write a program to implement DFS and BFS.	02
14	6	CO5	Write a program to implement Linear and Binary Search Techniques.	02
15	5	CO5	Write a program to implement a)Quick sort b)Bubble sort c)Insertion d)Selection	02
		Total		**30**

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Data Structure	Seymour Lipschutz , Tata McGraw Hill	10: 0070701989 13: 9780070701984
2	An Introduction to Data Structures with applications	Tremblay, Sorenson,Tata McGraw Hill	0070651507

E-References:

1) https://www.javatpoint.com/data-structure-tutorial
2) https://www.geeksforgeeks.org/data-structures/

CO Vs PO and CO Vs PSO Mapping (Computer Engineering)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	3	2	3	3	2	3	3
CO2	2	2	3	3	1	3	2	2	3	2
CO3	2	3	3	2	2	2	2	2	2	2
CO4	2	3	2	3	2	3	3	2	3	3
CO5	1	2	3	3	2	3	3	2	3	3
CO6	2	2	3	3	2	3	3	2	3	3

CO Vs PO and CO Vs PSO Mapping (Information Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	3	2	3	3	2	3	2
CO2	2	2	3	3	1	3	2	2	3	2
CO3	2	3	3	2	2	2	2	3	2	2
CO4	2	3	2	3	2	3	3	2	3	3
CO5	1	2	3	3	2	3	3	3	3	3
CO6	2	2	3	3	2	3	3	2	3	3

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MAKING KNOWLEDGE TO WORK

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Programme : Diploma in ME/CE/EE/CO/IF/IS/EC/RT/LT/LG (Sandwich Pattern), AIML										
Course Code: UV19R102				Course Title: Universal Human Values-II						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total (Credit)	TH (2 Hrs 30min)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
--	--	-	02	-	-	-	--	-	--	--

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) . * Indicates assessment by External Examiner else internal practical skill test . # indicates Self, on- line learning Mode. @ indicates on line examination Note: For Minimum passing marks under various heads, refer, examination rule AR26.Two practical skill tests are to be conducted. First skill test at mid-term and second skill test at the end of the term.

Rationale:

Universal Human Values-I course helps students to discover themselves and comfortably connect with their peers. Students experienced living in harmony with nature by visiting a nature park and participating in activities like tree plantation, beach cleaning and institute cleaning.

Universal Human Values-II course is more focused on helping students to create health consciousness and experience living in harmony with their bodies. It will help to create a holistic perspective based on self-exploration about themselves, family, society and nature.

Interactions with underprivileged sections of society will help to inculcate values like empathy, accountability and social gratitude. Patriotic values will be imbibed by learning about the constitution of India. Through experiential learning, an ideal personality will be developed to excel in the field of work. It is the journey of thought process from 'my family' to 'world family'.

Course Outcomes: On completion of this course, student should be able to

CO1	Develop empathy for others.
CO2	Understand and appreciate duties and civic responsibilities.
CO3	Develop health consciousness
CO4	Develop respect and recognition for others work.
CO5	Understand the importance of living in harmony with nature and society.

Course Content Details:

Sr. No	Activity	Related Value/s	Methodology of Implementation	Student's Role	Mentor's role	Resources Required
01	Essay writing i)Role of engineer in development of nation ii)Global warming and its remedies iii)My favorite book iv)Bad and good of social media v)My best friend Mentor can add more essay topics related to mentioned values.	Social gratitude, Harmony in behavior, Accountability	Selecting a topic from the list and writing an essay on it	Thoughtfully write the essay on a selected topic.	Display the best essays on the notice board.	Notice board, panel of judges
02	Visiting under-privileged children of less or same age group - understand their life, difficulties, compare with your life, ' give ' them what you can i)Blind school ii)Slums iii)Physically handicapped schools iv)Adiwasi pada	Empathy Compassion Accountability Joy of Giving Social Gratitude	Students to arrange visit under supervision of mentor. Identify and impart technical skills needed to improve their lives.	Interact with the children, Observe their life pattern. Make them aware about technologies used in daily life.	Verify the visit plan and arrangements done by students see that discipline and safety is maintained during visit.	Traveling facilities, food and sufficient drinking water
03	Read preamble of constitution and list down duties and responsibilities of a citizen	Patriotism Integrity Loyalty Harmony Righteousness	Read preamble of constitution of India from internet website	Brainstorm to understand importance of preamble.	Motivate students to present different stories related to Indian constitution	https://www.constitutionofindia.net/constitution_of_india/preamble
04	To visit war memorial/ Hutatma smarak in city	Patriotism Respect	Students to arrange activity under supervision of mentor	List available war memorial/ Hutatma smarak in nearby area	Scrutinize and monitor the visit plan made by students	Traveling facilities, food and sufficient drinking water
05	Prepare your own SWOT Analysis	Self-exploration, Honesty	Analysis and report writing	Thoughtfully analyze self	Explain process of SWOT analysis	Case studies

06	Student will prepare a diet chart, analyze food consumption habit-List food consumed during last 3 days and identify its nutritional effects on body	Health consciousness	Balanced diet chart preparation	Find out the ways to maintain balanced diet chart	Provide information resources	Internet websites, Professional dietician
07	Identify 5 personalities from the areas like sports, defence, politics,, businesses and social work who have demonstrated great spirit of integrity in their life and write a report. e.g. **Rajendra singh-** Water man of india, **Dr. A P J Abdul kalam-** scientist and former president of india. **Mohammed Yunus-** Bangladeshi social entrepreneur, **Kapil Dev-**Cricketer of the century. **David Packard-** Chairman of Hewlett-Packard (HP)	Integrity , respect	Information collection and analysis	Identify personalities and study their extra-ordinary work	Guide students to identify various dimensions of the personality	Internet websites, Institute Library
08	Spend an hour with the local municipal corporation disaster management cell.	Recognition of others' work	Visit disaster management cell of local municipal corporation in groups	Interact with the officers and staff	Distribute different groups of students in different local municipal corporations	List of local municipal corporations
09	Spend a day in a local housing society to spread awareness about efficient use of energy while using elevators and home appliances as well as during transportation	Environment Conservation	Interaction with society residents and office bearers	Identify local housing society, interact with people and write report	Make students aware about energy audit	Energy auditor

10	Study the Sustainable Development Goals of the United Nations for peace and prosperity of people and the planet, now and into the future by visiting the following website: https://sdgs.un.org/goals	Social Gratitude, Empathy, Compassion, Accountability	Visit the website, study history and List 17 sdgs	Study the sdg in detail (assigned to your group by mentor), prepare presentation	Assign 17 sdgs to different groups of students	Local NGOs working for UN

Methodology:

1. The course is Non Examination, Credit Course.
2. The course will be introduced during the student induction programme (orientation programme) of one week duration. Most of the activities are to be completed during induction programme and to be continued throughout the term during SCA hours under the guidance of mentor.
3. The mentor will be assigned to the student for a group of 20 students each.
4. In consultation and under supervision of a mentor, the student/ Group of students has to complete the activity.
5. Activities no.2, 7, 8 and 10 can be performed in collaboration with related government organizations or industries (under CSR activity).
6. All events will be organized and managed by students. The mentor will work as a facilitator/ advisor.
7. The strategies to learn the course is "Self Exploratory and Experiential Learning"
8. The onus of responsibility for completing the activities is with students.
9. The student has to complete at least five no. of activities throughout the term to earn the credits.

References/ Books:

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

E-References:

1) **https://youtu.be/kOlu1vj_BVk (The 10 MostImportant Human Values)**
2) **Dr. Prakash Baba Amte- Movie**
3) **https://youtu.be/QeogOlzG2ls (Value of Education -short film)**
4) **https://www.constitutionofindia.net/constitution_of_india/preamble**
5) **https://slidemodel.com/personal-swot-analysis-quick-guide/**
6) **https://possible.in/balanced-diet-chart.html**

E-References for mentors:

1) **https://www.edutopia.org/**
2) **https://sdgs.un.org/goals**

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5	Mrs. Swati D. Deshpande	Ex-Principal	Government Polytechnic, Mumbai
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7	Mr. K. V. Patil	Lecturer, Mechanical Engineering	Government Polytechnic, Mumbai

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