

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Diploma Mining Engineering

Semester-II

- A) Course Code : 2000271(046)
B) Course Title : Communication Skills-II
C) Pre- requisite Course Code and Title :
D) Rationale :

In the present competitive world communication skills are vital for growth in any field. Communication Skills in English is one of the core skills to be developed in diploma graduates as students exchange information and convey their ideas and opinions with different stakeholders. The present curriculum continues to focus on the attainment of course outcomes related to speaking, reading, writing and listening as verbal, non-verbal and written communication are essential in order to deliver and receive information quickly and accurately.

This curriculum is advancement over the previous to meet the existing industrial and entrepreneurial challenges by focusing on the attainment of professional communication skills and enable the students for effective communication in diverse situations.

E) Course Outcomes:

- CO-1 Use grammatically correct sentences in Speaking and Writing.
CO-2 Demonstrate appropriate non-verbal expression while communicating with others.
CO-3 Compose paragraphs and draft letters using correct formats.
CO-4 Draft different types of report, notices and mails in prescribed format.

F) Scheme of Studies:

S.No.	Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)			
				L	P	T	Total Credit(C) L+ T+(P/2)
1.	Humanities	2000271 (046)	Communication Skills-II	2	-	1	3

L-Lecture, P-Practical, T-Tutorial

Legend: L: Classroom Instruction (Includes different instructional strategies i.e. Lecture and other), P: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies) T- Tutorial includes Sessional Work (SW) (includes assignment, seminar, mini project etc.) and Self Learning (SL), C: Credits

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

G) Scheme of Assessment:

S. No	Board of Study	Course Code	Course Title	Scheme of Examination					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1.	Humanities	2000271 (046)	Communication Skills-II	70	20	30	-	-	120

Legend: ESE: End Semester Exam, CT: Class Test, TA: Teacher Assessment

- Note:** i. Separate passing is must for TA component of Progressive Assessment, both for theory and practical.
ii. Separate passing is must for End Semester Exam (Theory) and End Semester Exam (Practical).

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their

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attainment by the students through Classroom Instruction (L), Laboratory Instruction (P), T- Tutorial includes Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.

CO-1 Use grammatically correct sentences in Speaking and Writing.

(Hours-12)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO1.1 Use modifiers in proper place SO1.2 Use auxiliaries SO1.3 Change Narration SO1.4 Use different degree in sentences SO1.5 Correct Use of Adverbial Phrases.		Unit-1.0 English Grammar 1.1 Auxiliary Verbs 1.2 Modifiers & Adverbial Phrases 1.3 Degree 1.4 Narration	<ul style="list-style-type: none">One Word SubstitutionRearrangement of Jumbled words

SW-1 Suggested Sessional Work (SW):

a. Assignments:

- Exercises on the topic: Modifiers, Narration, Degree etc.

b. Mini Project:

- Express your views by writing an incidence using proper grammar.
- Select topic and share your views on the same with the audience. (2-3 min.)

c. Other Activities (Specify):

- Practice for speaking skills in front of mirror for self feedback.

CO-2 Demonstrate appropriate non-verbal expression while communicating with others in different situations.

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(Hours- 8)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO2.1 Explain the features and use of static and dynamic features of non verbal communication. SO2.2 Interpret the gesture, posture and facial expression in the given photograph and visual.	LE2.1 Use appropriate gestures, eye movements, facial expressions, postures for communication. LE2.2 Demonstrate appropriate etiquettes while working in team and group.	Unit-2.0 Non-Verbal Communication 2.1 Static features of Non Verbal Communication – Distance, Posture, Physical contact etc. 2.2 Dynamic features of Non-Verbal Communication – Mannerism, Head & Hand movement, Eye to Eye contact, Facial expressions, Gestures.	<ul style="list-style-type: none">Collect data about good postures, expressions, visuals related to non verbal communication for Effective Communication.Imitate your ideal personality.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

- Collection of pictures and visuals with static and dynamic features of non verbal communication.
- Interpretation of gesture, posture and facial expression in the given photograph and visual.

b. Mini Project:

- Seminar on topics related to “Role of non verbal communication for developing effective communication in technical education”.

c. Other Activities (Specify):

- Role play on given theme such as: When a student gets exceptionally good marks or less marks in 10th board exams, bank manager refuses to sanction the education loan at the last moment, unrest among the first year students during fresher party. Student and teacher can add the themes as per requirement.

CO-3 Compose paragraphs & draft letters, using correct format.

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(Hours-14)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO3.1 Draft business letters. SO3.2 Draft Job application and Resume SO3.3 Develop paragraphs on different topics		Unit- 3.0 Paragraph & Letter Writing 3.1 Paragraph writing. 3.2 Letter writing 3.2.1 Purposes of Letters 3.2.2 Characteristics of a Letter 3.2.3 Types of Business Letters -Applications for Job & Resume Writing -Letter of Enquiry -Letter for Order Placement -Letter of Complaints	<ul style="list-style-type: none"> Read the sample letter, circular, notice, case and paragraph on selected theme on Internet.

SW-3 Suggested Sessional Work (SW) :

a. Assignments:

- Write an application to apply for campus recruitment drive to be held in your college.
- Draft business letters.

b. Mini Project:

- Prepare Resume and cover letter for job vacancy.
- Write a letter to appropriate authority informing about the activities to be conducted in Department/Institute.

c. Other Activities (Specify):

- Analyze the given case and suggest views/opinion with respect to case brief.

CO-4 Draft different types of reports notices and mails in correct format.

(Hours –14)

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Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
<p>SO4.1 Explain the characteristics of a good report.</p> <p>SO4.2 Explain general outline of a project report</p> <p>SO4.3 Prepare Progress reports in correct format.</p> <p>SO4.4 Draft Notices & mails</p>	<p>LE4.1 Write and submit a notice on the given theme.</p> <p>LE4.2 Draft an Email to the Principal of your institute informing that you couldn't attend regular classes etc.</p>	<p>Unit 4.0 Technical Report Writing</p> <p>4.1 Report Writing</p> <p>4.1.1 Characteristics of a Good Report.</p> <p>4.1.2 Types of Technical Report.</p> <p>4.2 General outline of Project Report</p> <p>4.3 Progress Report of any assumed work</p> <p>4.4 Notice</p> <p>4.4.1 Purposes of Notices</p> <p>4.4.2 Qualities of Notices</p> <p>4.4.3 Format of Notice</p> <p>4.5 Mail</p> <p>4.5.1 Purposes of Mail</p> <p>4.5.2 Format of Mail</p>	<ul style="list-style-type: none"> Read and practice different Types of Reports.

SW-4 Suggested Sessional Work (SW) :

a. Assignments:

- Prepare notice for your class/department as per given directions.
- Describe qualities of a good report.
- Draft a progress report of any assumed work.

b. Mini Project:

- Draft a report on any significant activity that had taken place in your locality.
- Draft a report on culture event/ sports event conducted at your institute.

c. Other Activities (Specify):

- Draft notices for sports activities/ lost belongings/ various competitions/celebrations.

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

I) Suggested Specification Table (For ESE of Classroom Instruction):

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Unit Number	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
I	English Grammar	2	8	10	20
II	Non verbal communication	2	3	5	10
III	Paragraph & Letter Writing	3	7	10	20
IV	Technical Report writing	3	5	12	20
Total		10	23	37	70

Legend: R: Remember, U: Understand, A: Apply and above

J) Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, Whatsapp, Mobile, Online sources)
8. Brainstorming

K) Suggested Learning Resources:

(a) Books :

S. No.	Title	Author	Publisher	Edition & Year
1	English Grammar in Use	Murphy Raymond	Cambridge Publications	4 th Edition
2	Living English Structure	Allen	Cambridge Publications	Fifth edition(2009)
3	Effective English with CD	Kumar, E. Suresh; Sreehari,P.; Savithri, J.	Pearson Education, Noida, New Delhi	2009 ISBN: 978-81-317-3100-0
4	English Grammar at Glance	Gnanamurali, M.	S. Chand and Co. New Delhi,	2011 ISBN:9788121929042
5	A Course in Technical English	TTTI Bhopal		
6	Elementary English Grammar and Composition	Agarwal N.K.	Goyal Brothers Prakashan	Latest Edition
7	A Study Guide on Communication Skills for Technical Students	Dr. Sumi Guha Dr. Shameena Bano	Vaibhav Prakashan	1 st Edition, 2020 ISBN-978-93-89989-25-0

(b) Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [language-labs.com](http://www.language-labs.com/)
13. www.wordsworthelt.com

(c) Others:

1. Learning Packages.
2. Lab Manuals.
3. Language software Manual
4. Users' Guide

L) List of Major Laboratory Equipment and Tools:

S. No.	Name of Equipment	Broad Specifications	Relevant Experiment Number
1	Computers	A complete computer system with headphones & Speakers	All
2	Software	English Communication Softwares – Globalina, A-One Solutions, Wordsworth, Spears	All
3.	Computer tables & chairs	Depending upon the size of the Language Lab	All

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M) Mapping of POs & PSOs with COs:

Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	PO-1 Basic knowledge	PO-2 Discipline knowledge	PO-3 Experiments and practice	PO-4 Engineering Tools	PO-5 The engineer and society	PO-6 Environment and sustainability	PO-7 Ethics	PO-8 Individual and team work	PO-9 Communication	PO-10 Life-long learning	PSO-1	PSO-2
CO-1 Use grammatically correct sentences in Speaking & Writing.	2	1	1		-	-	-	1	2	3	2	1
CO-2 Demonstrate appropriate non-verbal expression while communicating with others.	1	1	2	2	-	-	-	2	2	3	1	2
CO-3 Compose paragraphs & draft letters, using correct format.	1	1	1		-	-	1	1	3	2	2	2
CO-4 Draft different types of reports notices and emails in correct format.	2	1	2	2	-	1	-	2	3	3	2	2

Legend: 1 – Low, 2 – Medium, 3 – High

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N) Course Curriculum Map:

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction(P)	Classroom Instruction (L)	Self Learning (SL)
PO1,2,3,8,9,10 PSO 1,2	CO-1 Use grammatically correct sentences during Speaking & Writing.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		Unit-1.0 English Grammar 1.1, 1.2, 1.3, 1.4	As mentioned in relevant pages
PO 1,2,3,4,8,9,10 PSO 1,2	CO-2 Demonstrate appropriate non-verbal expression while communicating with others.	SO2.1 SO2.2	LE2.1 LE2.2	Unit-2.0 Effective Communication 2.1, 2.2	
PO 1,2,3,7,8,9,10 PSO 1,2	CO-3 Compose paragraphs & draft letters, using correct format.	SO3.1 SO3.2 SO3.3		Unit-3.0 Short Stories 3.1, 3.2	
PO 1,2,3,4,6,8,9,10 PSO 1,2	CO-4 Draft different types of reports, notices and emails in prescribed format.	SO4.1 SO4.2 SO4.3 SO4.4	LE4.1 LE4.2	Unit- 4.0 Passages for Comprehension 4.1, 4.2, 4.3, 4.3, 4.4,4.5	

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- A) Course Code : 2000272(014)
 B) Course Title : Applied Maths-II
 C) Pre- requisite Course Code and Title :
 D) Rationale :

This subject is introduced to those topics of mathematics, which are applied in different branches of engineering so that it can enhance required skills in mathematics underpinning engineering subjects. Integral calculus helps to find the area; differential equation is used in finding the curves and its related applications for various engineering models. Numerical integration is used to find the area of the functions especially whose integration cannot be evaluated easily with routine methods. This course further develops the skills to enable large engineering systems to be modeled.

E) Course Outcomes:

- CO-1 Solve the given problems of integration using suitable methods.
 CO-2 Use the concept of integration to find area of given curves.
 CO-3 Model the given engineering problems using the concept of differential equation.
 CO-4 Utilize the concepts of numerical methods to solve given equations.
 CO-5 Measure the area using the concept of numerical integration for engineering related problems.

F) Scheme of Studies:

S.No.	Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)			
				L	P	T	Total Credits(C) L+T+(P/2)
1	Applied Science	2000272(014)	Applied Maths-II	2	-	1	3

Legend: L: Classroom Instruction (Includes different instructional strategies i.e. Lecture and other), P: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies) T- Tutorial includes Sessional Work(SW) (includes assignment, seminar, mini project etc.) and Self Learning (SL), C: Credits

Note: SW and SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

G) Scheme of Assessment:

S. No	Board of Study	Course Code	Course Title	Scheme of Examination					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1	Applied Science	2000272 (014)	Applied Maths-II	70	20	30	-	-	120

- Note:** i. Separate passing is must for TA component of Progressive Assessment, both for theory and practical.
 ii. Separate passing is must for End Semester Exam (Theory) and End Semester Exam (Practical).

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (L), Laboratory Instruction (P), T- Tutorial includes Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.

CO-1 Solve the given problems of integration using suitable methods.

(Approx. Hrs: 07)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO1.1 Solve the given simple problem(s) based on rules of integration. SO1.2 Obtain the solution of given simple integral(s) using substitution method. SO1.3 Integrate given simple functions (integration by parts). SO1.4 Evaluate the given simple integral by using partial fractions.	--	Unit-1.0 Integral Calculus 1.1 Simple Integration: Rules of integration and integration of standard functions. 1.2 Methods of Integration: 1.21 Integration by substitution. 1.22 Integration by parts 1.23 Integration by partial fractions.	<ul style="list-style-type: none">Rules of integrationMethods of integration.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

- Expound examples of integration in day-to-day life.
- Enumerate the value of integrals for engineering related problems.

b. Mini Project:

- Prepare charts displaying standard integration formulas.
- Identify problems based on application of integration.

c. Other Activities (Specify):

- Identify engineering problems based on real world problems with the use of free tutorials available on the Internet.
- Use graphical software EXCEL, D-PLOT and GRAPH for related topics.
- Use MATHCAD as mathematical tool to solve the problems of integral calculus.
- Prepare a seminar on basic applications of integrals.

CO-2 Use the concept of integration to find area of given curves.

(Approx. Hrs: 11)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO2.1 Solve given simple problems based on properties of definite integration. SO2.2 Apply the concept of definite integration to find the area under the given curve (s). SO2.3 Utilize the concept of definite integration to find area between given two curves.		Unit-2.0 Applications of Integral Calculus 2.1 Definite Integration 2.11 Simple examples 2.12 Properties of definite integral (without proof) and simple examples. 2.2 Applications of integration 2.21 Area under the curve. 2.22 Area between two curves.	<ul style="list-style-type: none">• Standard formulas of simple integration• Properties of definite integrals.• Formulas for area between two curves

SW-2 Suggested Sessional Work (SW):

a. Assignments:

- Enumerate the area of irregular shapes by using concept of integration.
- Explore the use of definite integrals related to engineering applications.

b. Mini Project:

- Prepare charts showing area of irregular shapes using concept of integration.

c. Other Activities (Specify):

- Identify engineering problems based on real world problems with the use of free tutorials available on the Internet.
- Use graphical software EXCEL, D-PLOT and GRAPH for topics related to Integral calculus.
- Use MATHCAD as mathematical tool to solve the problems of integral calculus.
- Seminar on engineering applications of definite integrals.

CO-3 Model the given engineering problems using the concept of differential equation.

(Approx. Hrs: 11)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
<p>SO3.1 Find the order and degree of given differential equation(s).</p> <p>SO3.2 Form differential equation for given simple engineering problem.</p> <p>SO3.3 Solve given differential equation using the variable separable method.</p> <p>SO3.4 Obtained the solution of given Homogeneous Differential Equation.</p> <p>SO3.5 Solve the given linear differential equations.</p>	--	<p>Unit-3.0 Differential equations of first order and first degree</p> <p>3.1 Concept of differential equation</p> <p>3.2 Order, degree and formation of differential equation.</p> <p>3.3 Solution of differential equation</p> <p>3.31 Variable separable form.</p> <p>3.32 Homogeneous Differential Equations</p> <p>3.33 Linear differential equation.</p>	<ul style="list-style-type: none"> Terminologies of differential equations. Formation, order and degree of differential equations. Methods of solution of differential equation

SW-3 Suggested Sessional Work (SW):

a. Assignments:

- Enumerate population growth using the concept of differential equations.
- Use initial conditions to solve differential equations for engineering applications.

b. Mini Project:

- Prepare flow charts showing various methods for solving first order first-degree differential equations.
- Prepare model showing the applications of differential equation for Newton's law of cooling.
- Prepare models using the concept of differential equations for mixing problem.

c. Other Activities (Specify):

- Identify engineering problems based on real world with the use of free tutorials available on the Internet.
- Use graphical software EXCEL, D-PLOT and GRAPH for applications of differential equations and related topics.
- Use MATHCAD as mathematical tool to solve the problems of engineering related to differential equations.
- Identify engineering problems related to differential equations.

CO-4 Utilize the concepts of numerical methods to solve given equations.

(Approx. Hrs: 07)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO4.1 Determine the roots of given equations using Bisection method.		Unit-4 Numerical Solutions of Equations Introduction of algebraic and transcendental equations	<ul style="list-style-type: none"> Roots of equations by Bisection Method
SO4.2 Calculate the roots of given equations using Regula Falsi method.		4.1 Bisection method 4.2 Regula Falsi method	<ul style="list-style-type: none"> Roots of equations using Regula Falsi Method
SO4.3 Compute the roots of given equations using Newton-Raphson method.		4.3 Newton Raphson method	<ul style="list-style-type: none"> Solution of equations using Newton-Raphson Method

SW-4 Suggested Sessional Work (SW):

a. Assignments:

- Write algorithm to find the approximate roots of algebraic equations.
- Write algorithm to find the approximate roots of transcendental equations.

b. Mini Project:

- Prepare graph showing the roots of algebraic equation.
- Prepare graph for finding the roots of equation by Regula falsi method.
- Prepare graph for finding the roots of equation by Newton-Raphson method
- Prepare a seminar on any relevant topic based on numerical method.
- Identify suitable numerical methods for engineering related problems.

c. Other Activities (Specify):

- Identify engineering problems based on real world problems with the use of free tutorials available on the Internet.
- Use graphical software EXCEL, D-PLOT and GRAPH for related topics.
- Use MATHCAD as mathematical tool to solve the given equations by numerical methods

CO-5 Measure the area using the concept of numerical integration for civil engineering.

(Approx. Hrs: 12)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO5.1 Apply the concept of Numerical integration to find area from given data by Trapezoidal rule SO5.2 Utilize the concept of Numerical integration to find area from given data by Simpson's one third rule SO5.3 Use the concept of Numerical integration to find area from given data by Simpson's three eighth rule.		UNIT 5.0 Numerical Integration Introduction to Numerical integration 5.1 Trapezoidal rule 5.2 Simpson's one third rule 5.3 Simpson's three eighth rule	<ul style="list-style-type: none">Integration by Trapezoidal rule.Integration by Simpson's one-third rule.Integration by Simpson's three eighth rule.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

- Prepare chart showing the different formulas of numerical integration.
- Compare the results obtained by Trapezoidal and Simpson's rule for area related problems.
- Explore the role of numerical integration in engineering related problems.

a. Mini Project:

- Prepare a seminar on different methods of numerical integration.
- Prepare a model showing the civil engineering applications of numerical integration.

b. Other Activities (Specify):

- Identify engineering problems based on real world problems with the use of free tutorials available on the Internet.
- Use graphical software EXCEL, D-PLOT and GRAPH for related topics.
- Seminar on applications of numerical integration.

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

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I) Suggested Specification Table (For ESE of Classroom Instruction):

Unit Number	Unit Title	Marks Distribution			Total Marks
		R	U	A	
I	Integral Calculus	2	2	6	10
II	Applications of Integral Calculus	2	6	8	16
III	Differential equations of first order and first degree	2	6	8	16
IV	Numerical Solutions of Equations	2	2	6	10
V	Numerical Integration	2	6	10	18
Total		10	22	38	70

Legend: R: Remember, U: Understand, A: Apply and above

J) Suggested Specification Table (For ESE of Laboratory Instruction*): NA

Laboratory Instruction Number	Short Laboratory Experiment Title	Assessment of Laboratory Work (Marks)			
		Performance		Viva-Voce	
		PRA	PDA		
-	-	-	-	-	-

*Assessment rubric, process and product check list with rating scale need to be prepared by the course wise teachers for each experiment for conduction and assessment of laboratory experiments /practical ,

Legend: PRA: Process Assessment, PDA: Product Assessment

K) Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Industrial visits
6. Industrial Training
7. Field Trips
8. Portfolio Based Learning
9. Role Play
10. Demonstration
11. ICT Based Teaching Learning (Video Demonstration, CBT, Blog, Face book, Mobile)
12. Brainstorming
13. Others

L) Suggested Learning Resources:

(a) Books :

Sl. No.	Title	Author	Publisher	Edition & Year
1	Advanced Engineering Mathematics	Krezig, Ervin	Wiley Publ., New Delhi	2014, ISBN: 978-0-470-45836-5
2	Advanced Engineering Mathematics	H. K. Das	S. Chand & Co, New Delhi	ISBN: 9788121903455
3	Higher Engineering Mathematics	B. S. Grewal	Khanna Publ., New Delhi	2015, ISBN: 8174091955
4	Engineering Mathematics, Volume 1	S. S. Sastry	PHI Learning, New Delhi	2009, ISBN: 978-81-203-3616-2
5	A text book of Engineering Mathematics	Dutta, D	New age International publications, New Delhi	2006 ISBN: 978-81-24-1689-3
6	Getting Started with MATLAB-7	Pratap, Rudra	Oxford University Press, New Delhi,	2009 ISBN: 0199731241

(b) Open source software and website address:

- 1 www.scilab.org/ -SCI Lab
- 2-www.dplot.com/ -DPlot
- 3 www.allmathcad.com/ -MathCAD
- 4 www.wolfram.com/mathematica/ - MATHEMATICA
- a. www.easycalculation.com

(c) Others:

1. Learning Packages.
2. Lab Manuals.
3. Manufacturers' Manual
4. Users' Guide

M) List of Major Laboratory Equipment and Tools: NA

S. No.	Name of Equipment	Broad Specifications	Relevant Experiment Number
-	-	-	-

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N) Mapping of POs & PSOs with COs:

Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	Basic knowledge PO-1	Discipline knowledge PO-2	Experiments & Practice PO-3	Engineering Tools PO-4	The Engineer & Society PO-5	Environment & Sustainability PO-6	Ethics PO-7	Individual & Team work PO-8	Communication PO-9	Life Long learning PO-10	PSO-1	PSO-2
CO-1	√	√	√	-	-	-	-	√	√	√		
CO-2	√	√	√	-	-	-	-	√	√	√		
CO-3	√	√	√	-	-	-	-	√	√	√		
CO-4	√	√	√	-	-	-	-	√	√	√		
CO-5	√	√	√	-	-	-	-	√	√	√		

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O) Course Curriculum Map:

POs & PSOs No.	COs No. & Title.	SOs No.	Laboratory Instruction (P)	Classroom Instruction (L)	Self Learning (SL)
PO-1, 2,3,8,9,10 PSO---	CO-1 Solve the given problems of integration using suitable methods.	SO1.1 SO1.2 SO1.3 SO1.4		Unit-1.0 Integral Calculus 1.1, 1.2	1.1(a), 1.2(a)
PO-1, 2,3,8,9,10 PSO---	CO-2 Use the concept of integration to find area of given curves.	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2.0 Applications of Integral Calculus 2.1,2.2	2.1(a), 2.1(b), 2.2(a)
PO-1, 2,3,8,9,10 PSO---	CO-3 Model the given engineering problems using the concept of differential equation.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5		Unit-3.0 Differential equations of first order and first degree 3.1,3.2,3.3	3.1(a), 3.2(a), 3.3(a)
PO-1, 2,3,8,9,10 PSO---	CO-4 Utilize the concepts of numerical methods to solve given equations.	SO4.1 SO4.2 SO4.3		Unit-4.0 Numerical Solutions of Equations 4.1, 4.2, 4.3	4.1(a), 4.2(a), 4.3(a)
PO-1, 2,3,8,9,10 PSO---	CO-5 Measure the area using the concept of numerical integration for civil engineering	SO5.1 SO5.2 SO5.3		Unit-5.0 Numerical Integration 5.1,5.2,5.3	5.1(a), 5.2(a), 5.3(a)

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- A) **Course Code** : 2000273(020)
- B) **Course Title** : Environmental Engineering and Sustainable Development
- C) **Pre- requisite Course Code and Title** :
- D) **Rationale** : The world has changed drastically during the last half century, both technologically, economically and socially. In present time, solid waste, e-waste, air pollution, water and land pollution and conservation of natural resources wants more attention. The growth of multinational businesses, the depletion of national and natural resources, and the tremendous advances in technology in many countries raised concerns over issues of Environment climate Change and Sustainable Development. We are also witnessing the emergence of Green and Clean Technology for Sustainable Development. In this context, the understanding about environment issues and challenges is very essential for engineers as it guide for sustainable development.

The knowledge and application of such aspects is essential in developing a good technician who should be conversant with the core concepts, principles and practices of environment pollution problems and sustainable development (SD).

This course is designed to serve as foundation knowledge for diploma studies in Engineering. It will introduce the concept of environmental issues, problems due to pollution and social & economical dimensions including disaster management for SD. The future engineers must use 3R concept by focusing on changing patterns of Engineering Design, Production, Consumption, and use of natural and non conventional energy resources optimally and judiciously by enforcing laws and legislatives during any engineering projects.

E) **Course Outcomes :**

- CO-1 Describe causes, prevention and remedial measures of water and air pollution.
- CO-2 Explain causes, prevention and remedial measures of Soil, Noise, Thermal and Nuclear pollution.
- CO-3 Create awareness about sustainable development and clean technology.
- CO-4 Perform Environmental Impact Assessment (EIA) for new design and project
- CO-5 Create awareness for social issues and the environment.

F) **Scheme of Studies:**

S.No	Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)			
				L	P	T	Total Credits(C) L+T+(P/2)
1	Civil Engineering	2000273 (020)	Environmental Engineering and Sustainable Development	2	-	1	3

Legend: L: Classroom Instruction (Includes different instructional strategies i.e. Lecture and other), P: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies) T- Tutorial includes Sessional Work(SW) (includes assignment, seminar, mini project etc.) and Self Learning (SL), C: Credits

Note: SW and SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

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G) Scheme of Assessment:

S.No	Board of Study	Course Code	Course Title	Scheme of Examination					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1	Civil Engineering	2000273 (020)	Environmental Engineering and Sustainable Development	70	50	30	-	-	150

Note: i. Separate passing is must for TA component of Progressive Assessment, both for theory and practical.
ii. Separate passing is must for End Semester Exam(Theory) and End Semester Exam(Practical).

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (L), Laboratory Instruction (P), T- Tutorial includes Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.

CO-1 Describe causes, prevention and remedial measures of water and air pollution.

(Approx. Hrs: L+P+T = 10)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
<p>SO1.1 Develop awareness for Global Environmental problems.</p> <p>SO1.2 Explain causes of water pollution and describe its prevention and remedial measures.</p> <p>SO 1.3 Explain causes of air pollution and describe its prevention and remedial measures.</p>	--	<p>UNIT-1 Water pollution and Air pollution</p> <p>1.0 Introduction to environment and environment pollution</p> <p>1.1 Water pollution</p> <p>1.1.1 Introduction</p> <p>1.1.2 sources of water pollution</p> <p>1.1.3 classification of water pollutants</p> <p>1.1.4 adverse effect of water pollution</p> <p>1.1.5 control of water pollution</p> <p>1.1.6 Physical and chemical standard of domestic water as per Indian standard.</p> <p>1.2 Air pollution</p> <p>1.2.1 Introduction</p> <p>1.2.2 Sources of air Pollutants</p> <p>1.2.3 classification of air Pollutants</p> <p>1.2.4 Effect of air pollution on human plant, animal.</p> <p>1.2.5 Air monitoring system</p> <p>1.2.6 Air pollution control</p>	<ul style="list-style-type: none"> Study of health hazards of water pollution. Explain with help of diagram the working of pollution control devices <ul style="list-style-type: none"> a. Cyclone separators b. Electrostatic precipitators.

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SW-1 Suggested Sessional Work (SW) :

a. Assignments:

- Describe in a tabular format the various causes of air and water pollution.
- Make a chart for physical and chemical standard of domestic water as per Indian standard.

b. Mini Project:

- Collect information about water and air quality in the vicinity from local bodies and discuss the findings.

CO- 2 Explain causes, prevention and remedial measures of Soil, Noise, Thermal and Nuclear pollution.

(Approx. Hrs: L+P+T = 10)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO2.1 Recognise causes of Soil pollution. SO 2.2 Explain causes of Noise pollution. SO 2.3 Recognise the Thermal as pollutant. SO 2.4 Describe radiation and its pollution effects.		UNIT-2 Soil, Noise , Thermal and Nuclear pollution 2.1 Soil pollution 2.1.1 introduction 2.1.2 sources of soil pollution 2.1.3 adverse effect of soil pollution 2.1.4 control measures of soil pollution 2.2 Noise pollution 2.2.1 Introduction 2.2.2 measurement of noise and acceptable noise level 2.2.3 sources of noise pollution 2.2.4 effect of noise pollution 2.2.5 control of noise pollution 2.3 thermal pollution 2.3.1 introduction 2.3.2 effects of thermal pollution 2.3.3 causes 2.3.4 control 2.4 Radioactive pollution 2.4.1 introduction 2.4.2 sources of radioactive pollution 2.4.3 Adverse effects of radioactive pollution 2.4.4 control of radioactive pollution	<ul style="list-style-type: none">Identify the modern equipments and methods for measurement of Soil, Noise and Thermal pollution.

SW-2 Suggested Sessional Work (SW) :

a. Assignments:

- Write short notes on sources and effects of
 - Soil Pollution
 - Noise Pollution
 - Thermal Pollution
 - Radio active Pollution

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b. Mini Project:

- i. Collect informations from local bodies for their efforts and findings regarding soil pollution in vicinity.

CO-3 Create awareness about sustainable development and clean technology.

(Approx. Hrs: L+P+T = 10)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
<p>SO3.1 Recognize the concept of sustainable development.</p> <p>SO3.2 Appreciate the importance of management, consumption & conservation of natural resources.</p> <p>SO3.3 Explain clean technology.</p> <p>SO 3.4 Recognize the importance of waste minimization.</p> <p>SO3.5 Appreciate importances of solar power, hydel, wind power and biomass energy.</p>		<p>Unit 3. Sustainable Development and Clean technologies</p> <p>3.1 Sustainable Development</p> <p>3.1.1 Concept of sustainable development</p> <p>3.1.2 Natural resources, a-biotic and biotic resources</p> <p>3.1.3 Principles of conservation of energy and management</p> <p>3.1.4 Need of Renewable energy</p> <p>3.1.5 Growth of renewable energy in India and the world</p> <p>3.1.6 Concept of waste management and recycling</p> <p>3.2 Clean Technologies</p> <p>3.2.1 Introduction: Clean technology</p> <p>3.2.2 Types of Energy</p> <p>3.2.3 Conventional Energy Sources</p> <p>3.2.4 Non-conventional Sources of Energy</p> <p>3.2.5 Recycling pollution control</p> <p>3.3 Solar Power</p> <p>3.3.1 Features of solar thermal and PV systems</p> <p>3.3.2 Types of solar cookers and solar water heaters</p> <p>3.4 Hydel Energy and its advantages</p> <p>3.5 Wind energy –advantages and limitations</p> <p>3.6 Biomass energy</p> <p>3.6.1 Types of Biomass Energy Sources</p> <p>3.6.2 Energy content in biomass of different types</p> <p>3.6.3 Types of Biomass conversion processes</p> <p>3.6.4 Biogas production</p>	<ul style="list-style-type: none"> Utilisation of biofuels and electricity in transportation sector.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Explain concept of sustainable development.
2. Describe conventional and non conventional energy sources with suitable example.

b. Mini Project:

1. Prepare a report on energy scenario in India context.

CO- 4 Perform Environmental Impact Assessment (EIA) for new design and project

(Approx. L+P+T = 10)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO4.1 Carry out EIA for a new engineering product /projects. SO4.2 Develop Post EIA report. SO4.3 Implement EIA findings ensuring Sustainable development		Unit 4.0 Envi. Impact Assessment (EIA) 4.1 Public Participation in EIA 4.1.1 EIA documentation 4.1.2 Case studies on EIA 4.1.3 EIA scope & steps 4.2 EIA process 4.2.1 EIA report 4.2.2 EIA Gazette notification 4.2.3 EIA action plan 4.3 EIA implementation 4.3.1 EIA directives 4.3.2 follow-ups	<ul style="list-style-type: none">• Study the reports of EIA of a construction project

SW-4 Suggested Sessional Work (SW):

a. Assignments:

- i. Prepare EIA for Roads construction
- ii. Prepare sugar industry EIA advertisement for a daily news papers

b. Other Activities (Specify):

- i. Mock drill for EIA session

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CO- 5 Create awareness for social issues and the environment.

(Approx. Hrs: L+P+T = 08)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO5.1 Appreciate conservation of water. SO5.2 Explain acid rain , green house effect, depletion of ozon layer, global warning. SO5.3 Understand solid waste management.		Unit 5.0 Social Issues And The Environment 5.1 Water conservation 5.2 Rain water harvesting 5.3 Watershed management 5.4 Acid rain and its effect 5.5 Climate change 5.6 Green house effect 5.7 Depletion of Ozon layer and effect of Ozon layer depletion 5.8 Global warming and measures against global warming 5.9 Solid waste management: causes, effects and control measures of urban and industrial waste, importance of 3R's in waste management. 5.10 Environment protection Act 1986: importance and objective	<ul style="list-style-type: none">Study rain water harvesting system in a building.

SW-5 Suggested Sessional Work (SW) :

a. Assignments:

- Explain conservation of water.
- Write notes on current global environment issues.

b. Mini Project:

- Discuss the case study of Bhopal gas leak disaster.
- Discuss the method of solid waste management adopted by local authority in the vicinity.

Note: Performance under Laboratory and Sessional work may appear in more than one Cos/Sos.

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I) Suggested Specification Table (For ESE of Classroom Instruction):

Unit Number	Unit Title	Marks Distribution			Total Marks
		R	U	A	
I	Water pollution and Air pollution	4	6	4	14
II	Soil, Noise , Thermal and Nuclear pollution	4	6	4	14
III	Sustainable Development and Clean technologies	4	6	4	14
IV	Environmental Impact Assessment (EIA)	4	6	4	14
V	Social issues and the environment	4	6	4	14
Total		20	30	20	70

Legend: R: Remember, U: Understand, A: Apply and above

J) Suggested Specification Table (For ESE of Laboratory Instruction*): NA

Laboratory Instruction Number	Short Laboratory Experiment Title	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
-	-	-	-	-

* Assessment rubric, process and product check list with rating scale need to be prepared by the course wise teachers for each experiment for conduction and assessment of laboratory experiments /practicals

Legend: PRA: Process Assessment, PDA : Product Assessment

K) Suggested Instructional/Implementation Strategies:

- 1) Improved Lecture
- 2) Case Method
- 3) Group Discussion
- 4) Industrial visits
- 5) Field Trips
- 6) Demonstration
- 7) ICT Based Teaching Learning (Video Demonstration, CBT, Blog, Face book, Mobile)

L) Suggested Learning Resources:

(a) Books :

S. No.	Title	Author	Publisher	Edition & Year
1	Environmental studies	Dr. Suresh K. Dhameja	S K kataria and sons	2012
2	Energy, Environment Ecology & Society	Dr. Surinder Deswal	Dhanpat Rai & sons	2014
3	Environment & Ecology	Dr. Plyush Kant Pandey	Sun India Publication	2009
4	Energy and sustainable development	P S Ramakrishnan	National Book Trust	2014
5	Our Environment (Hindi Textbook)	M k Goyal	Agrawal publications Agra	2013

(b) Open source software and website address :

1. www.nptel.ac.in
2. <https://swayam.gov.in>

M) List of Major Laboratory Equipment and Tools: NA

S. No.	Name of Equipment	Broad Specifications	Relevant Experiment Number
-	-	-	-

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N) Mapping of POs & PSOs with COs:

Course Outcomes (COs) Titles	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	Basic knowledge PO-1	Discipline knowledge PO-2	Experiments & Practice PO-3	Engineering Tools PO-4	The Engineer & Society PO-5	Environment & Sustainability PO-6	Ethics PO-7	Individual & Team work PO-8	Communication PO-9	Life Long learning PO-10	PSO-1	PSO-2
CO-1 Describe causes, prevention and remedial measures of water and air pollution.	1	1	1	1	3	3	3	3	1	3	1	1
CO-2 Explain causes, prevention and remedial measures of Soil, Noise, Thermal and Nuclear pollution.	1	1	1	1	3	3	3	3	1	3	1	1
CO-3 Create awareness about sustainable development and clean technology	1	1	1	1	3	3	3	3	1	3	1	1
CO-4 Perform Environmental Impact Assessment (EIA) for new design and project	1	1	1	1	3	3	3	3	1	3	1	1
CO-5 Create awareness for social issues and the environment.	1	1	1	1	3	3	3	3	1	3	1	1

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O) Course Curriculum Map:

POs & PSOs No.	COs No. & Title	SOs No.	Laboratory Instruction (P)	Classroom Instruction (L)	Self Learning (SL)
PO- 1 to 10 PSO-1,2	CO-1 Describe causes, prevention and remedial measures of water and air pollution.	SO1.1 SO1.2 SO1.3	--	UNIT-1 Water pollution and Air pollution 1.0 1.1 : 1.1.1 – 1.1.6 1.2 : 1.2.1 – 1.2.6	As mentioned in relevant pages.
PO- 1 to 10 PSO-1,2	CO-2 Explain causes, prevention and remedial measures of Soil, Noise, Thermal and Nuclear pollution.	SO 2.1 SO 2.2 SO 2.3 SO 2.4	--	Unit 2.0 Soil, Noise , Thermal and Nuclear pollution 2.1: 2.1.1- 2.1.4 2.2 : 2.2.1 -2.2.5 2.3 : 2.3.1 -2.3.4 2.4 : 2.4.1 - 2.4.4	
PO- 1 to 10 PSO-1,2	CO-3 Create awareness about sustainable development and clean Technology	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	--	Unit 3.0 Sustainable Development and Clean Technologies 3.1:3.1.1 - 3.1.6 3.2 : 3.2.1 -3.2.5 3.3 : 3.3.1,3.3.2 3.4 3.5 3.6 : 3.6.1 – 3.6.4	
PO- 1 to 10 PSO-1,2	CO4- Perform Environmental Impact Assessment (EIA) for new design and project	SO4.1 SO4.2 SO4.3	--	Unit 4.0 Envi. Impact Assessment (EIA) 4.1 : 4.1.1 - 4.1.3 4.2 : 4.2.1 - 4.2.3 4.3 : 4.3.1,4.3.2	
PO- 1 to 10 PSO-1,2	CO-5 Create awareness for social issues and the environment.	SO5.1 SO5.2 SO5.3	--	Unit 5.0 Social Issues And The Environment 5.1 – 5.10	

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Semester-II

- A) Course Code : 2000274(015)
B) Course Title : Applied Physics
C) Pre- requisite Course Code and Title :
D) Rationale :

Engineering diploma holders have to deal with physical properties of various materials, measurements of physical quantities, basic tools, and maintenance of machines in the industrial environment. Diploma holder must have a skill to apply the knowledge of basic concepts and principles of measurements, mechanics, waves, properties of materials, motion, friction, fluid mechanics, optics, optical instruments, electricity, magnetism and modern physics in solving broad based engineering problems. This course of engineering physics helps diploma engineers to achieve the course outcomes and provide sound background for self-development in future to cope up with new innovations.

E) **Course Outcomes:**

- CO-1 Estimate errors in measurement of physical quantities.
CO-2 Solve mechanics related engineering problems by applying the knowledge of forces and properties of materials.
CO-3 Solve engineering problems using relevant optical equipment by applying the principles of ray optics.
CO-4 Apply concepts of electrostatics, magnetism and electricity to solve engineering problems.
CO-5 Solve engineering problems by applying the knowledge of modern physics.

F) **Scheme of Studies:**

S.No	Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)			
				L	P	T	Total Credits(C) L+T+(P/2)
1	Applied Science	2000274 (015)	Applied Physics	2	-	1	3
2	Applied Science	2000290 (015)	Applied Physics (Lab)	-	2	-	1

Legend: L: Classroom Instruction (Includes different instructional strategies i.e. Lecture and other) P: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies) T- Tutorial includes Sessional Work (SW) (includes assignment, seminar, mini project etc.) and Self Learning (SL), C: Credits

Note: SW and SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

G) Scheme of Assessment:

S.No	Board of Study	Course Code	Course Title	Scheme of Examination					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1	Applied Science	2000274 (015)	Applied Physics	70	20	30	-	-	120
2	Applied Science	2000290 (015)	Applied Physics Lab	-	-	-	30	50	80

Note: i. Separate passing is must for TA component of Progressive Assessment, both for theory and practical.
 ii. Separate passing is must for End Semester Exam(Theory) and End Semester Exam(Practical).

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (L), Laboratory Instruction (P), T- Tutorial includes Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.

CO-1 Estimate errors in measurement of physical quantities.

(Approx Hrs . L+W+P = 12)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO1.1 Convert unit of the given physical quantity from one-unit system to other.	LE1.1 Use Vernier Calipers to measure the dimensions of given object in significant figures and estimate errors precisely.	Unit-1.0 Units, Measurement and Error analysis 1.1 Unit of physical quantity 1.11 Fundamental and derived unit	<ul style="list-style-type: none"> Advantages/ disadvantages of SI unit system Seven basic and Supplementary units
SO1.2 Derive the formula of derived physical quantity using dimensional analysis.	LE1.2 Use Screw gauge to measure the dimensions of given object in significant figures and estimate errors precisely.	1.2 Unit system 1.21 CGS, MKS and SI (a) Advantages/disadvantages of SI unit system (b) Seven basic and	

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SO1.3 Calculate the error in the given measurement with justification.	LE1.3 Use Spherometer to measure the dimensions of given objects in significant figures and estimate error precisely.	<p>Supplementary units.</p> <p>1.3 Dimensional Analysis</p> <p>1.31 Dimensional formula and equations.</p> <p>1.32 Applications of Dimensional equations.</p> <p>1.33 Numerical problems on Dimensional analysis.</p> <p>1.4 Measurement</p> <p>1.41 Accuracy, Precision and Errors.</p> <p>1.42 Absolute, Relative and percentage Error.</p> <p>1.5 Significant figures and rounding off.</p>	
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SW-1 Suggested Sessional Work (SW):

a. Assignments:

- Measure dimensions of class room, house hold items, thickness of paper, aluminum foil, iron bar and items found in surroundings.
- Analyze the correctness of given physical relation using dimensional analysis.
- Identify the instruments used for measurement of seven fundamental quantities.
- Identify instruments used for measurement of derived quantities.

b. Mini Project:

- Prepare working model of measuring instruments – Vernier Calipers, screw gauge.
- Collect low dimension items from household and market and calculate the thickness with the help of Vernier Calipers and screw gauge.

c. Other Activities (Specify):

- Seminar on Errors in measurements.
- Seminar on precision and accuracy of any instrument.

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CO-2 Solve mechanics related engineering problems by applying the knowledge of forces and properties of materials.

(Approx Hrs . L+W+P = 18)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO2.1 Classify conservative and non-conservative forces in a given situation. SO2.2 Explain Gravitational forces and related constants at given place. SO2.3 Differentiate between types of Moduli of elasticities for given solids. SO2.4 Select a given fluid on the basis of surface tension and viscosity.	LE2.1 Determine g using simple pendulum. LE2.2 Determine terminal velocity of given object by Stoke's law apparatus. LE2.3 Determine surface tension of water by Capillary rise method.	Unit-2.0 Force and General Properties of matter 2.1 Force 2.11 Types of Forces (a) Conservative and non- conservative forces (b) Frictional Forces, Limiting static and dynamic friction. (c) Centripetal and centrifugal force and (d) their illustration. (e) Gravitational Force 'G' and 'g' and their interrelation, Factors affecting 'g'	<ul style="list-style-type: none"> Types of Forces. Factors affecting 'g' Elastic limit and elastic fatigue Cohesive and adhesive force Streamline and turbulent flow
		2.2 Elasticity 2.21 Hooke's law (a) Elastic limit and elastic fatigue 2.22 Moduli of elasticities (a) Young's modulus, Bulk Modulus, Shear modulus of rigidity 2.3 Surface Tension 2.31 Molecular force, surface energy, effect of temperature 2.32 Cohesive and adhesive force 2.33 Excess pressure and its illustration, rise of liquid in capillary tube 2.4 Viscosity 2.41 Coefficient of	

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		viscosity, Newton's law of viscosity	
		2.42 Streamline and turbulent flow, Reynolds number	
		2.43 Poiseuille's equation (no derivation of formula), Stoke's law and their applications	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

- Find the value of 'g' at different locations of India and justify the reasons for variations.
- Enumerate the examples of conservation of angular momentum in day to day life.
- Enumerate the applications of surface tension in daily life.
- Explore the use of different liquid on the basis of their viscosity.

b. Mini Project:

- Prepare a setup to show frictionless motion on slanting surface.
- Prepare a model to compare elasticity of different materials.

c. Other Activities (Specify):

- Seminar on artificial and natural satellite.
- Seminar on weightlessness in lifts and space.

CO-3 Solve engineering problems using relevant optical equipment by applying the principles of ray optics.

(Approx Hrs . L+W+P = 16)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO3.1 Compare the wavelength and frequency of different components of electromagnetic spectrum and locate visible range.	LE3.1 Calculate refractive index of material of glass slab.	Unit-3.0 Optics, optical instruments and optical fibers	• Absolute and relative refractive index
SO3.2 Explain the phenomena of total internal reflection in optical fiber.	LE3.2 Calculate refractive index of material of glass prism.	3.1 Refraction 3.11 Laws of refraction 3.12 Lenses and combination of lenses	• Applications of TIR
SO3.3 Select materials on the basis of refractive index.	LE3.3 Calculate focal length of convex/concave lenses accurately.	3.2 Absolute and relative refractive index 3.21 Refraction through prism, Angle of minimum deviation and its relation	
	LE3.4 Determine the Critical angle for total Internal reflection of given medium w. r. t. air.	3.3 Total internal reflection of light 3.31 Critical angle.	
	LE3.5 Determine Numerical aperture of Optical fiber		

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		3.32 Applications of TIR 3.33 Optical fiber, NA of Optical fiber 3. 4 Optical instruments 3.41 Simple and compound microscope 3.42 Spectrometer 3.5 Electromagnetic spectrum 3.51 Pure and Impure spectrum, Visible range	
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SW-3 Suggested Sessional Work (SW):

a. Assignments:

- i Write details of method of finding refractive index of liquid using hollow prism
- ii Prepare detail report on the frequency range of electromagnetic waves interaction in daily life.

b. Mini Project:

- i Prepare working model to demonstrate the TIR in Optical fiber.
- ii Prepare model of microscope with house hold materials and lens.

c. Other Activities (Specify):

- i. Visit to BSNL like organizations to observe the role of optical fibers in communication.
- ii. Seminar on industrial application of Optical fiber.

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CO-4 Solve electrical engineering problems by applying concepts of electrostatics, magnetism and electric current.

(Approx Hrs . L+W+P = 18)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
<p>SO4.1 Explain Coulomb's law, electric potential and electric field for given charge distribution.</p> <p>SO4.2 Determine capacity of a capacitor with given dielectric materials.</p> <p>SO4.3 Use Ohm's law for different combinations of resistance to calculate current and potential difference.</p>	<p>LE4.1 LE4.1 Use Ohm's law to calculate unknown resistance in a given circuit.</p> <p>LE4.2 Determine the resistance of given circuits by applying series and parallel combination of resistance.</p> <p>LE4.3 Determine the specific resistance of the given material by using meter bridge.</p> <p>LE4.4 Use deflection magnetometer for comparison of magnetic moments of two bar magnets.</p> <p>LE4.5 Draw the magnetic lines of forces using bar magnet and compass needle.</p> <p>LE4.6 To compare e.m.f of two cells using potentiometer.</p> <p>LE4.7 To determine internal resistance of a cell.</p>	<p>Unit-4.0. Electrostatics, Magnetism and Current Electricity</p> <p>4.1 Electric Charge, Coulomb's Law</p> <p>4.2 Electric Field, Potential, Potential Difference between Two Points, Equi- potential Surfaces</p> <p>4.3 Types of dielectrics and dielectric Strength</p> <p>4.4 Capacity, Units, Principle of Capacitor</p> <p>4.41 Factors Affecting Capacity, type of capacitors</p> <p>4.5 Magnetism: -</p> <p>4.51 Magnetic lines of force, lines of induction,</p> <p>4.6 Current Electricity</p> <p>4.61 Resistance, Specific resistance</p> <p>4.62 Series and parallel combination of resistance</p> <p>4.63 Internal resistance of a cell</p> <p>4.64 Potential difference and e.m.f of a cell</p> <p>4.65 Combination of cells in series and in parallel.</p> <p>4.66 Simple applications of Wheatstone bridge, metre bridge and Potentiometer.</p> <p>4.67 Electrical power</p>	<ul style="list-style-type: none"> • Equi- potential Surfaces • Factors affecting Capacity, types of capacitors • Specific resistance • Wheats- tone Bridge principle applications

SW-4 Suggested Sessional Work (SW):

a. Assignments:

- Prepare list of dielectric materials with dielectric constant.
- Analyze the role of resistance and capacitors in house hold electrical items viz. electric fans etc.
- Prepare list of instruments/ equipment's using Magnets in house hold appliances and Labs.

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b. Mini Project:

- Prepare working models of capacitors.
- Collect some resistance and capacitors from nearby electrical shops and measure its value using multi-meter.
- Prepare circuits with LED to illustrate the series and parallel combination of resistance.
- Prepare cells using different electrolytes.

c. Other Activities (Specify):

- Seminar on applications of resistance and capacitors.
- Market survey for availability of electronic items in the local market.
- Calculate domestic monthly electricity bill.

CO- 5 Solve engineering problems by applying the knowledge of modern physics.

(Approx Hrs. L+W+P = 16)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
<p>SO5.1 Apply the knowledge of photoelectric effect and X-rays in a given situation.</p> <p>SO5.2 Compare laser with other sources of light.</p> <p>SO5.3 Explain the working principle and applications of Optical fiber</p>	<p>LE5.1 Calculate the work function of given photoelectric materials accurately.</p> <p>LE5.2 Calculate the divergence of given laser.</p>	<p>UNIT 5. Modern Physics</p> <p>5.1 Photoelectric effect</p> <p>5.11 Laws of photoelectric emission, Photoelectric equation and threshold frequency</p> <p>5.12 Photo cell</p> <p>5.2 X-rays</p> <p>5.21 Production of X rays, properties & uses.</p> <p>5.3 Laser</p> <p>5.31 Spontaneous and stimulated emission</p> <p>5.32 population inversion, pumping scheme and active system</p> <p>Ruby Laser and semiconductor laser</p> <p>5.4 Ultra-sonics</p> <p>5.41 Frequency range</p> <p>5.42 Methods of production-</p>	<ul style="list-style-type: none"> Photo cell Properties & uses of X rays. Applications of Optical Fiber

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		Magnetostriction & Piezo electric method 5.43 Properties of ultra- sonics 5.44 Applications of ultra- sonics.	
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Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Self-Learning

SW-5 Suggested Sessional Work (SW):

a. Assignments:

- ii. To study different medical applications of ultra-sonics and X-rays.
- iii. Prepare list of type of laser used in office and house hold devices.

b. Mini Project:

- i. To design a working model for the production of ultra-sonics.
- ii. Determine the divergence of key chain laser purchased from local market.

c. Other Activities (Specify):

- i. Seminar on industrial applications of ultra-sonics.
- ii. Seminar on X ray.
- iii. Seminar on engineering applications of laser

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

I) Suggested Specification Table (For ESE of Classroom Instruction):

Unit Number	Unit Title	Marks Distribution			Total Marks
		R	U	A	
I	Units, Measurement and Error analysis	5	3	4	12
II	Forces and General Properties of matter	3	3	8	14
III	Optics, optical instruments and optical fibers	2	4	6	12
IV	Electrostatics, Magnetism and Current Electricity	4	8	6	18
V	Modern Physics	4	5	5	14
Total		18	23	29	70

Legend: R: Remember, U: Understand, A: Apply and above

J) Suggested Specification Table (For ESE of Laboratory Instruction*):

Laboratory Instruction Number	Short Laboratory Experiment Title	Assessment of Laboratory Work (Marks)			30 Marks are allocated for performance under ESE.
		Performance		Viva-Voce	
		PRA	PDA		
LE1.1	Vernier Calipers	15	12	3	
LE1.2	Screw gauge	15	12	3	
LE 1.3	Spherometer	15	12	3	
LE2.1	Young modulus	18	9	3	
LE2.2	'g' by Simple pendulum	18	9	3	
LE2.3	Viscosity of liquid	19	8	3	
LE2.4	Surface tension by capillary rise method	19	8	3	
LE3.1	Refractive index of glass slab	18	9	3	
LE3.2	Combination of lens	21	6	3	
LE3.3	Refractive index of Prism	15	12	3	
LE4.1	Ohm's Law	15	12	3	
LE4.2	Series and parallel combination of resistance	15	12	3	
LE4.3	Specific Resistance	19	8	3	
LE 4.4	Deflection galvanometer	20	7	3	
LE4.5	Magnetic lines of Forces	21	6	3	
LE4.6	Comparison of e.m.f of cells	21	6	3	
LE4.7	Internal resistance of a cell	21	6	3	
LE5.1	Photo electric effect	18	9	3	
LE5.2	Diode laser	21	6	3	

* Assessment rubric, process and product check list with rating scale need to be prepared by the course wise teachers for each experiment for conduction and assessment of laboratory experiments /practicals

Legend: PRA: Process Assessment, PDA: Product Assessment

Note: Only one experiment has to be performed at the end semester examination of 30 Marks as per assessment scheme

K) Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Industrial visits
6. Industrial Training
7. Field Trips
8. Portfolio Based Learning
9. Role Play
10. Demonstration
11. ICT Based Teaching Learning (Video Demonstration, CBT, Blog, Face book, Mobile)
12. Brainstorming
13. Others

L) Suggested Learning Resources:

(a) Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Fundamentals of Physics	Halliday, David; Resnik, Robert and Walker, Jearl	John Wiley and sons	Tenth edition 2013
2	The Feynman Lectures on Physics	Feynman P. Richar, B. Leighton Robert Sands Matthew	Pearson Education India	First edition 2012
3	University physics	Young Hugh, Freedman Roger	Pearson Education India	Thirteenth Edition 2013

(b) Open source software and website address:

1. Some relevant Experiments: <http://cdac.olabs.edu.in>
2. Vernier Calipers: <http://www.tutorvista.com/physics/animations/vernier-callipers-animation>
3. Screw gauge: www.notesandsketches.co.uk/Measuring_Tools_Small.swf
4. <http://www.stefanelli.eng.br/en/virtual-vernier-caliper-simulator-05-millimeter>
5. Some relevant Experiments and theory topics:
<https://phet.colorado.edu/en/simulations/category/physics>
6. Photoelectric effect: <http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1>
7. Deflection magneto meter: http://emv-au.vlabs.ac.in/Deflection_Magnetometer/
8. Laser: <https://spaceplace.nasa.gov/laser/en/>

(c) Others:

1. Learning Packages.
2. Lab Manuals.
3. Manufacturers' Manual
4. Users' Guide

M) List of Major Laboratory Equipment and Tools:

S. No.	Name of Equipment	Broad Specifications	Relevant Experiment Number
1	Vernier calipers	Stainless steel body, Range: 0-150mm, Resolution: 0.1mm	LE1.1
2	Screw gauge	Stainless steel spindle and ratchet top brass body with satin chrome finish. Graduated to read up to 25mm in 0.01mm divisions with screw pitch of 0.5mm, ratchet lock nut	LE 1.2
3	Spherometer	Brass double disc superior quality, stainless steel legs and screw 1/100mm pitch each.	LE1.3
4	Pendulum apparatus for determination of 'g'	200 mm diameter metal wheel mounted with fixed stand and a meter scale, stop watch to measure time. steel case fly back action least count 1/10 th or 1/5 th of second	LE2.2
5	Stoke's Law apparatus	Glass tube (~1-inch diameter and length ~ 1 m) with stand, timer, steel sphere, glass beads	LE2.3
6	Surface tension set up	Travelling microscope with horizontal and vertical movement (LC 0.001 cm), capillary tube, beaker, pin fixed on adjustable stand	LE2.4
7	Glass slab	Rectangular, all sides polished, made from slightly greenish glass free from bubbles, 75*50*18 mm	LE3.1
8	Glass Prism	Equilateral or right angled, from bubble free borosil crown glass 38 x 38	LE 3.2
9	Ohm's law apparatus	Box type with D.C meter to verify ohm's law with fitted ammeter & voltmeter	LE4.1
10	Post Office Box	Complete set in polished wooden box, Split brass contact blocks holding precision cut, interchangeable plug having molded black fluted tops. Coils of constantan wire with 4 pair of ratio arms.	LE4.2
12	Meter Bridge (Wheatstone Bridge)	Sun mica top, two gap type having lock type terminals with pencil jockey.	LE4.3
13	Deflection magnetometer	Wooden base length ~ 1 m, magnetic compass, meter scale and magnets	LE4.4

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14	Bar magnet	Alnico size 3"- 4"	LE 4.5
15	Potentiometer	10K Ohm 500mW Linear Slide Potentiometer. About 10 m wire of Manganin and constantan with high resistivity and low temperature coefficient stretched on a wooden board attached with a meter scale and pencil jockey.	LE 4.6 LE 4.7
16	Photoelectric apparatus	Includes photo cell, light sources, voltmeter, ammeter	LE5.1
17	Diode laser	Power 5 mW, randomly polarized	LE5.2

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N) Mapping of POs & PSOs with COs:

Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PSO-1	PSO-2
CO-1	3	2	3	-	-	-	1	1	2	1		
CO-2	3	2	2	1	-	1	-	1	1	1		
CO-3	3	2	2	1	1	1	-	1	1	1		
CO-4	3	1	1	1	1	1	1	1	1	1		
CO-5	3	1	1	-	-	-	-	1	-	1		

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O) Course Curriculum Map:

POs No.	COs No.	SOs No.	Laboratory Instruction (P)	Classroom Instruction (L)	Self-Learning (SL)
PO-1,2,3,7,8,9,10 PSO---	CO-1	SO1.1 SO1.2 SO1.3	LE1.1 LE1.2 LE1.3	Unit-1.0 Units, Measurement and Error analysis 1.1, 1.2,1.3,1.4,1.5	As mentioned in relevant pages.
PO-1,2,3,4,6,8,9,10 PO-10 PSO-----	CO-2	SO2.1 SO2.2 SO2.3 SO2.4	LE2.1 LE2.2 LE2.3	Unit-2.0 Forces and General Properties of matter 2.1,2.2,2.3,2.4	
PO-1,2,3,4,5,6,8,9,10 PSO-----	CO-3	SO3.1 SO3.2 SO3.3 SO3.4	LE3.1 LE 3.2	Unit-3.0 Optics, optical instruments and optical fibers 3.1,3.2,3.3,3.4	
PO-1,2,3,4,5,6,7,8,9,10 PSO-----	CO-4	SO4.1 SO4.2 SO4.3	LE4.1 LE4.2 LE4.3 LE4.4 LE4.5 LE 4.6 LE4.7	Unit-4.0 Electrostatics, Magnetism and Current Electricity 4.1,4.2,4.3,4.4,4.5, 4.6	
PO-1,2,3,8,10 PSO-----	CO-5	SO5.1 SO5.2 SO5.3	LE5.1 LE5.2	Unit-5.0 Modern Physics 5.1,5.2,5.3,5.4,	

- A) Course Code : 2000275(037)
 B) Course Title : Basic Non Conventional Energy Sources
 C) Pre- requisite Course Code and Title :
 D) Rationale :

In the context of rapidly depleting fossil fuel resources and increasing power demand along with environmental concern it is imperative to look for the alternative sources of energy. Non conventional energy sources are feasible options to cope up the need to develop sustainable energy systems. It is hoped that with the advancement in technology and research efforts in the field of development of non-conventional sources of energy, these sources may prove to be cost-effective as well. The future of Wind, Solar, tidal and other energy sources is bright and these will play an important role in the world energy scenario and future employments. This course aims at developing the ability in the students to cope up with the working, construction and maintenance aspects of machinery, devices and components associated with these systems.

E) **Course Outcomes:**

- CO-1 Explore the role and prospects of non-conventional energy sources.
 CO-2 Explain construction, working and maintenance of Solar energy devices and components.
 CO-3 Describe construction and working of Wind energy related systems and subsystems.
 CO-4 Explain construction, working and maintenance of Biomass plants.
 CO-5 Describe construction and working of Geothermal, OTEC, Tidal and Micro Hydel energy systems and subsystems.
 CO-6 Explore the utility of fuel cell and hydrogen energy in various areas.

F) **Scheme of Studies:**

S.No	Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)			
				L	P	T	Total Credits(C) L+T+(P/2)
1	Mechanical Engineering	2000275 (037)	Basic Non Conventional Energy Sources	1	-	1	2
2	Mechanical Engineering	2000291 (037)	Basic Non Conventional Energy Sources (Lab)	-	2	-	1

Legend: L: Classroom Instruction (Includes different instructional strategies i.e. Lecture and others) P: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies), T- Tutorial includes Sessional Work(SW) (assignment, seminar, mini project etc.) and Self Learning(SL), C:Credits

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

G) **Scheme of Assessment:**

S.No	Board of Study	Course Code	Course Title	Scheme of Examination					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1	Mechanical Engineering	2000275 (037)	Basic Non Conventional Energy Sources	-	-	70	-	-	70
	Mechanical Engineering	2000291 (037)	Basic Non Conventional Energy Sources (Lab)	-	-	-	30	50	80

- Note:** i. Separate passing is must for TA component of Progressive Assessment, both for theory and practical.
ii. Separate passing is must for End Semester Exam(Theory) and End Semester Exam(Practical).

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (L), Laboratory Instruction (P), T- Tutorial includes Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.

CO-1 Explore the role and prospects of non-conventional energy sources.

(Approx. Hrs: L+P+T= 11)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO1.1 Classify the Conventional and non-Conventional energy sources. SO1.2 Explain the role of energy in nation's development. SO1.3 Explore the prospects of renewable energy sources.		Unit-1.0 Energy sources 1.1 Conventional and non- Conventional energy sources. 1.2 Energy consumption as a measure of Nation's development; strategy for meeting the future energy requirements Global and National scenarios. 1.3 Non-conventional energy- Seasonal variations and availability. Renewable energy – sources and features. 1.4 Hybrid energy systems, Distributed energy systems and dispersed generation (DG). 1.5 Prospects and Achievements of renewable energy sources in India in general and Chhattisgarh state in particular. 1.6 Issues related to power generation through renewable energy sources.	<ul style="list-style-type: none">Issues related to power generation through renewable energy sources.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

- Survey the literatures to establish the patterns of energy use in industry.
- Quantify the harmful effects of pollutants from conventional energy sources.
- Prepare a chart of cumulative achievements of renewable energy sources in India

b. Mini Project:

- Demonstrate the working principle of non conventional energy devices (at least three) with the help of classroom models.

c. Other Activities (Specify):

- Seminar on Quantum numbers.

CO-2 Explain construction, working and maintenance of Solar energy devices and components.

(Approx. Hrs: L+P+T = 11)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO2.1 Explain Beam and diffuse radiation. SO2.2 Explain earth sun angles. SO2.3 Enumerate the uses of Solar energy collectors. SO2.4 Explain the utility of low cost Solar cooker as alternative cooking appliances in villages. SO2.5 Describe the construction, working and maintenance of Solar energy devices. SO2.6 Select photo-voltaic cells for domestic lightning in houses.	LE2.1 Study of Solar Radiation by using Pyranometer. LE2.2 Study of working of Solar Distillation or Solar Still. LE2.3 Study / Demonstration of working of photovoltaic cells available in the lab. LE2.4 Demonstration/ study of working of solar water heater. LE2.5 Demonstration/ study of working of solar cooker LE2.6 Study of solar water heating system of 120 litre/day capacity for the institute's hostel. LE2.7 Demonstration/ Study of working of Solar pump and calculate its discharge	Unit-2.0 Solar energy 2.1 Solar radiation: Beam and diffuse radiation, Solar constant, earth sun angles, attenuation and measurement of Solar radiation, local Solar time, derived Solar angles. 2.2 Flat plate collectors, concentrating collectors, elements, working and maintenance. 2.3 Solar air heaters-types, Solar driers, elements, working and maintenance. 2.4 Storage of Solar energy-thermal storage, Electrical storage, Chemical storage. 2.5 Solar water heaters, Solar distillation, Solar still, Solar cooker, elements, working and maintenance. 2.6 Photo voltaics - Solar cells & its applications, Solar panels, Solar PV pump, Solar Home lighting systems, Solar street lights, elements, working and maintenance.	<ul style="list-style-type: none"> Estimation of Solar energy constants. Seasonal Solar energy variations effects on Solar devices.

SW-2 Suggested Sessional Work (SW) :

a. Assignments:

- Determine the collector efficiency of Solar flat plate collector.
- Identify the basic components of Solar water heater.
- Determine the collector efficiency of concentrating type flat plate collector.
- Identify of basic components of photo voltaic cell.
- Identify of basic components of Solar cooker.

b. Micro Project:

- Construct a model of low cost Solar cooker.
- Explore different methods for tilting the axis of Solar collector to adjust for variation in Solar energy during different hours of day.

c. Other Activities (Specify):

- Justify the use of Solar water heater as non conventional energy devices.
- Identify ways of storing Solar energy in the form of Chemical Energy, Thermal energy, Electromagnetic energy, Mechanical Energy, Electrical energy.

CO-3 Describe construction and working of Wind energy related systems and subsystems.

(Approx. Hrs: L+P+T = 11)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO3.1 Explain the energy conversion process in Wind mill. SO3.2 Describe the functions of basic elements of Wind mill. SO3.3 Classify Wind mills based on shaft position. SO3.4 Perform maintenance of Wind mills and turbines components.	LE3.1 Demonstration/ study of the working of a windmill.	Unit-3.0 Wind energy 3.1 Principle of Wind energy conversion; Basic components of Wind energy conversion systems. 3.2 Wind mill components, various types and their constructional features. 3.3 Maintenance of Wind mills and turbines.	<ul style="list-style-type: none">Performance parameters of Wind mill.Sites selection criterion for Wind mill installation in the country.

SW-3 Suggested Sessional Work (SW) :

a. Assignments:

- Prepare a demonstration model of Wind energy conversion system
- Compare horizontal and vertical Wind mill.
- Explore the potential sites for Wind mill installation in india.

b. Micro Project:

- Prepare a report on various types of gear boxes used in Wind mills and turbines.
- Prepare a list of mechanical components used in Wind mills and turbines.

c. Other Activities (Specify):

- Collect videos and user manuals related to maintenance of Wind mills and turbines components.

CO-4 Explain construction, working and maintenance of Biomass plants.

(Approx. Hrs: L+P+T = 11)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO4.1 Explain the constructional details of Bio gas conversion plant. SO4.2 Designing of Biogas digester. SO4.3 Classify Bio gas plants. SO4.4 Describe the maintenance procedure of Biogas plants and components.	LE4.1 Visit to biogas plants, domestic community/institution for study and demonstration of biogas plants.	Unit-4.0 Energy from Biomass 4.1 Biomass conversion, technologies, Biogas generation plants, classification, advantages and disadvantages. 4.2 Constructional details, site selection, filling a digester for starting, maintaining Biogas production, Fuel properties of Bio gas, and applications of Biogas. 4.3 Maintenance of Biogas plants.	<ul style="list-style-type: none"> Study of KVIP.

SW-4 Suggested Sessional Work (SW) :

a. Assignments:

- Identify the various components of Bio gas plant model.
- Identify the different Bio gas digesters.
- List the Performance characteristics of Bio gas plant.
- Slurry treatment parameters for efficient utilization of Bio gas fuels.

b. Micro Project:

- Make a small model of low cost Bio gas plant.

c. Other Activities (Specify):

- Collect videos related to maintenance of Bio gas plants.

CO-5 Describe construction and working of Geothermal, OTEC, Tidal and Micro Hydel energy systems and subsystems.

(Approx. Hrs: L+P+T = 10)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO5.1 Describe working of geothermal plant. SO5.2 Explain the constructional details of micro hydel plant. SO5.3 Describe the ocean thermal energy conversion system. SO5.4 Explain construction and working of a tidal energy plant.	LE5.1 Working principle of geothermal power plant. LE5.2 Scope of Mini and Micro- hydro power plants in your state	Unit-5.0 Geothermal, Micro Hydel, Ocean Thermal Energy Conversion and Tidal Energy 5.1 Geothermal plant. 5.2 Micro Hydel plant. 5.3 Ocean Thermal Electric Conversion (OTEC) systems like open cycle, closed cycle. 5.4 Energy from tides, basic principle of tidal power, single basin and double basin tidal power plants, advantages, limitation.	<ul style="list-style-type: none"> Closed and open cycle OTEC plant.

SW-5 Suggested Sessional Work (SW) :

a. Assignments:

- Identify the different parts of geothermal plant.
- Identify different components of micro hydel plant
- Justify the use of geothermal plant as a renewable source of energy.
- List the site selection criterion of geothermal plant.

b. Micro Project

- Prepare a report on performance of various Geothermal, OTEC, Tidal and Micro Hydel energy systems and subsystems available in our country.

CO-6 Explore the utility of fuel cell and hydrogen energy

(Approx. Hrs: L+P+T = 10)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO6.1 Classify the types of fuel cells. SO6.2 Describe the utility of hydrogen powered vehicle. SO6.3 Explain the	LE6.1 Study of different types of models of fuel cells available in lab & compare them.	Unit 6.0 Fuel cells and Hydrogen Energy 6.1 Introduction, principle and operation of fuel cell, Types of fuel cells, application of fuel cells. 6.2 Introduction, Hydrogen Production methods,	<ul style="list-style-type: none"> Hydrogen-oxygen fuel cell. Environmental aspect of traditional vehicle. Limitations of use of hydrogen as a fuel.

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		Hydrogen storage,	
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Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
safety measures in hydrogen Energy utilization.		hydrogen transportation, utilization of hydrogen gas, hydrogen as alternative fuel for vehicles.	

SW-6 Suggested Sessional Work (SW):

a. Assignments:

- Identify the different parts of fuel cell.
- Analyze the working of hydrogen powered vehicle.
- Describe the chemical reactions in H₂ – O₂ fuel cell.
- Enlist the practical fields where hydrogen is used as a fuel..

b. Other Activities (Specify):

- Collect state wise information of usage of Fuel cells and Hydrogen Energy through www.

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

I) Suggested Specification Table (For ESE of Laboratory Instruction*)

Laboratory Instruction Number	Short Laboratory Experiment Titles	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
LE2.1	Study of Solar Radiation by using Pyranometer	15	10	5
LE2.2	Study of Solar Distillation or Solar Still	15	10	5
LE2.3	Study the photovoltaic cells available in the lab .	15	10	5
LE2.4	Demonstration/ study of solar water heater .	15	10	5
LE2.5	Demonstration/ study of solar cooker	15	10	5
LE2.6	Study of solar water heating system of 120 litre/day capacity for the institute's hostel	15	10	5
LE2.7	Study of working of Solar pump and calculate its discharge .	15	10	5
LE3.1	Demonstration/ study of the working of a windmill.	15	10	5
LE4.1	Visit to biogas plants, domestic community/institution for study and demonstration of biogas plant .	15	10	5
LE5.1	Working principle of geothermal power plant.	15	10	5
LE5.2	Scope of Mini and Micro-hydro power plants in your state	15	10	5
LE6.1	Study of different types of models of fuel cells available in lab & compare them	15	10	5

*Assessment rubric, process and product check list with rating scale need to be prepared by the course wise teachers for each experiment for conduction and assessment of laboratory experiments /practical's

Legend: PRA: Process Assessment, PDA: Product Assessment

Note: Only one experiment has to performed at the end semester examination of **30 Marks** as per assessment scheme

J) Suggested Instructional/Implementation Strategies:

- 1.Improved Lecture
- 2.Tutorial
- 3.Industrial visits
- 4.Industrial Training
- 5.Field Trips
- 6.Portfolio Based Learning
- 7.Demonstration
- 8.ICT Based Teaching Learning (Video Demonstration, CBT, Blog, Face book, Mobile)

K) Suggested Learning Resources:

(a) Books :

S. No.	Titles	Author	Publisher and Edition*
1	Non conventional Energy Sources	G D RAI	Khanna Publishers New Delhi
2	Non-conventional Sources of Energy (Hindi)	S.S.L. PATEL	Standard Publishers and Distributors
3	Non conventional Energy Sources	BH KHAN	Tata McGraw Hill Publications
4	Renewable and Conventional energy	S Rao	Khanna Publishers New Delhi

*Latest edition of all above books should be referred

(b) Open source software and website address:

1. Introduction: <http://indiacore.com/bulletin/kssidhu-non-conventional-energy-resources.pdf>
2. Introduction : <http://www.newagepublishers.com/samplechapter/000329.pdf>
3. Wind turbines : <http://wind.machine-reliability.com/?adtype=Maschinenauf%C3%A4lle&addate=20161117&gclid=CJ350N6Wk9QCFdKHaaodYLICXw>
4. Wind turbines : <http://www.awea.org/operations-and-maintenance>
5. Wind turbines : <http://www.windmeasurementinternational.com/wind-turbines/om-turbines.php>
6. Wind turbines : <https://www.gerenewableenergy.com/wind-energy/turbine-services/wind-turbine-maintenance.html>

7. Wind turbines : <https://www.wind-energy-the-facts.org/operation-and-maintenance-costs-of-wind-generated-power.html>
8. Wind turbines : http://archive.northsearegion.eu/files/repository/20120320111424_PC_Skills-Compendiuminmaintenance.pdf
9. Solar panels : <https://www.thesolarco.com/how-to-maintain-your-solar-panels/>
10. Solar panels : <http://www.wikihow.com/Maintain-a-Solar-Panel>
11. Solar panels : http://www.poweringhealth.org/Pubs/Guyana_Solar_PV_Systems_Maintenance_Guide.pdf
12. Parabolic trough collector maintenance: http://mnre.gov.in/file-manager/UserFiles/CST-Manuals/PTC_E.pdf
13. Flat plate solar collector maintenance: <http://www.htproducts.com/literature/lp-364.pdf>
14. Specifications of solar devices: <http://mnre.gov.in/information/systems-specifications/>
15. Biogas plants : http://www.snv.org/public/cms/sites/default/files/explore/download/handbook_on_operation_and_maintenance_of_biogas_plants_bio-slurry_use_and_management.pdf
16. Biogas plants : <http://collections.infocollections.org/ukedu/en/d/Jg33ime/15.html>
17. Biogas plants : <https://www.youtube.com/watch?v=iOsixN3nTsc>
18. Solar cooker : <https://www.youtube.com/watch?v=7rYFXCciEx4>
19. Solar cooker : <http://www.sempersolaris.com/guide-solar-cookers/>
20. Wind turbine : https://www.youtube.com/watch?v=oPhNQ35_Dwo
21. Wind turbine : <https://www.youtube.com/watch?v=OzfM9NVgcjl>
22. Wind turbine : <https://www.youtube.com/watch?v=haPheNEitHQ>
23. Fuel cells: https://www.youtube.com/watch?v=_TqSU21aWoA

(c) Others:

1. Learning Packages.
2. Manufacturers' Manual

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L) List of Major Laboratory Equipment and Tools:

S. No.	Name of Equipment	Broad Specifications	Relevant Experiment Number
1	Flat plate Solar collector	Orientation Vertical (Portrait) Height / Width / Depth (mm) 2035 / 1233 / 80 Overall collector area (mm) 2.51 Aperture area (m ²) 2.35 Absorber area (m ²) 2.32 Weight (empty) (kg) 38 Capacity (solar fluid) (l) 1.85 Solar glass transmission (%) 91 Solar radiation absorption (%) 95 Solar radiation emission (%) 5 Efficiency η_0 (%) 79.0 Efficiency coefficient a_1 (W/M ² K) 2.41 Efficiency coefficient a_2 (W/M ² K ²) 0.049 Max operating pressure (bar) 10 Stagnation temperature ($^{\circ}$ C) 210 Certification CE 0036 & Solar Keymark Absorber Sheet Aluminium Absorber plate coating Sunselect (selective) Absorber tube Copper Absorber tube joints Laser welded Frame Aluminium Extruded sides / sheet rear Glazing Safety glass (low iron), 3.2mm Rear insulation 40mm Solar fluid Water / propylene glycol Flow / return connections DN 16 (G3/4")	LE2.4
2	Parabolic trough Solar collector with tracking system	Parabolic trough reflecting surface Reflectors with aluminium sheet or mirror Total Collector Area 288m ² Number of collector modules 48 Number of collectors per row 8 Number of rows 6 Area of each module 6m ² Module power 2 kW Coated receiver tubes enclosed in glass Fluid Inlet Temperature (nominal) 110 C Fluid Outlet Temperature (nominal) 220 C Tracking- Moves East-West Fixed North-South; Control system- Programmable Logic Controller (PLC) or Manual; Drive mechanism- Servo or Stepper motor, single axis.	LE2.4
3	Working models of wind mills and turbines	Readymade kits	LE3.1
4	Solar appliances like drier, cooker, lantern etc.	<ul style="list-style-type: none"> Solar Lantern: Housing material ABS, Chimney Material Acrylic, Polycarbonate or Shane, LED SMD LED, SPV Module High efficiency silicon 	LE2.2 , 2.3, 2.4 , 2.5 , 2.6 , 2.7

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		<p>cell based SPV module, Battery 12V-7.2Ah @ C-20 SMF lead acid battery of Absorbed Electrolyte type.</p> <ul style="list-style-type: none"> • Solar Fan: High speed ceiling fan, Operated by 12V DC 1.5A, RPM = 320, SIZE = 1200MM, MULTI SPEED • Solar Air drier: can generate hot air with temperature ranges from 40°C to 100°C. used for removing moisture from variety of agricultural products and food items without causing any harmful affect • Solar Distillation Capacity – 200 litres • Solar water pumps • Solar torches • Solar street lighting systems • Solar traffic blinker Solar mobile charger 	
5	Demonstration model of Biogas plant.		LE4.1
6	Models, Charts and videos related to non conventional sources of energy		LE 5.1 & 5.2
7	Digital Pyranometer	Response Time less than 15 seconds , Battery life : approx. 100 hr , Sensitivity : 5 to 20 μ V / W/m ² , Direction Response less than 20 W/m ² , Field of view 180 degree , Temperature response less than 5%	LE2.1
8	Fuel Cells	Hydrogen / Air Fuel Cell PEM Type Energy Conversion : 40%	LE6.1

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M) Mapping of POs & PSOs with COs:

Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)		
	PO-1 Basic knowledge	PO-2 Discipline knowledge	PO-3 Experiments and practice	PO-4 Engineering Tools	PO-5 The engineer and society	PO-6 Environment and sustainability	PO-7 Ethics	PO-8 Individual and team work	PO-9 Communication	PO-10 Life-long learning	PSO-1	PSO-2	PSO-3
CO-1 Explore the role and prospects of non-conventional energy sources.	1	2	-	-	2	3	1	1	2	2	-	-	-
CO-2 Explain construction, working and maintenance of Solar energy devices and components.	1	2	2	2	2	3	1	2	2	2	-	2	1
CO-3 Describe construction and working of Wind energy related systems and subsystems.	1	2	2	2	2	3	1	2	2	2	-	2	1
CO-4 Explain construction, working and maintenance of Biomass plants.	1	2	3	2	2	3	1	2	2	2	-	2	1
CO-5 Describe construction and working of Geothermal, OTEC, Tidal and Micro Hydrol energy systems and subsystems.	1	2	2	2	2	3	1	2	2	2	-	2	1
CO-6 Explore the utility of fuel cell and hydrogen energy in various areas.	1	2	2	2	2	3	1	2	2	2	-	2	1

Legend: 1 – Low, 2 – Medium, 3 – High

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N) Course Curriculum Map:

POs & PSOs No.	COs No. & Title	SOs No.	Laboratory Instruction (P)	Classroom Instruction (L)	Self Learning (SL)
PO 1,2,5,6, 7,8,9,10	CO-1 Explore the role and prospects of non-conventional energy sources.	SO1.1 SO1.2 SO1.3	----	Unit-1.0 Energy sources 1.1,1.2,1.3,1.4,1.5, 1.6	As mentioned in relevant pages
PO 1,2,4,5,6, 7,8,9,10 PSO 2,3	CO-2 Explain construction, working and maintenance of Solar energy devices and components.	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5 SO2.6	LE2.1 , LE 2.2 LE2.3 , LE 2.4 , LE2.5 , LE 2.6 , LE 2.7	Unit-2.0 Solar energy 2.1, 2.2 ,2.3, 2.4, 2.5 ,2.6	
PO 1,2,4,5,6, 7,8,9,10 PSO 2,3	CO-3 Describe construction and working of Wind energy related systems and subsystems.	SO3.1 SO3.2 SO3.3 SO3.4	LE3.1	Unit-3.0 Wind energy 3.1, 3.2, 3.3	
PO 1,2,4,5,6, 7,8,9,10 PSO 2,3	CO-4 Explain construction, working and maintenance of Biomass plants.	SO4.1 SO4.2 SO4.3 SO4.4	LE4.1	Unit-4.0 Energy from Biomass 4.1, 4.2, 4.3	
PO 1,2,4,5,6, 7,8,9,10 PSO 2,3	CO-5 Describe construction and working of Geothermal, OTEC, Tidal and Micro Hydel energy systems and subsystems.	SO5.1 SO5.2 SO5.3 SO5.4	LE5.1 , LE5.2	Unit-5.0 Geothermal, Micro Hydel, Ocean Thermal Energy Conversion and Tidal Energy 5.1, 5.2, 5.3, 5.4	
PO 1,2,4,5,6, 7,8,9,10 PSO 2,3	CO-6 Explore the utility of fuel cell and hydrogen energy in various areas.	SO6.1 SO6.2 SO6.3	LE6.1	Unit-6.0 Fuel cells and Hydrogen Energy 6.1, 6.2	

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- A) Course Code : 2000276(022)
B) Course Title : Computer Fundamentals and Applications
C) Pre- requisite Course Code and Title :
D) Rationale :

This course will enable diploma engineers to use computers and different applications for various computing purposes. It will enable technicians to perform for day-to-day computing activities, in particular- preparing professional documents, analyzing details graphical representations, and multimedia presentation for time to time decision making by the management of academia, business and industry. They would also be able to use Internet, cloud services and its security features for effective computing.

- E) **Course Outcomes:** The course content should be taught and implemented with the aim to develop the following outcomes in the students.

CO-1 Use effectively computer system and its peripherals.

CO-2 Prepare a professional document using various features of word-processing for academic/business/ industry.

CO-3 Create a spread sheet, analyze the data using different formula/ functions and represent it in different form of chart for solving academic/business/industrial problem.

CO-4 Create a professional multimedia presentation using its various features for an academic/business/ industrial application.

CO-5 Use Internet, Cloud services, and its security features for computing.

- F) **Scheme of Studies**

S.No	Board of Study	Course Code	Course Titles	Scheme Of Studies (Hours/Week)			
				L	P	T	Total Credits(C) L+T+(P/2)
1	Computer Science and Engineering	2000276 (022)	Computer Fundamentals and Applications	2	-	-	2
2	Computer Science and Engineering	2000292 (022)	Computer Fundamentals and Applications (Lab)	-	4	-	2

Legend: L: Classroom Instruction (Includes different instructional strategies i.e. Lecture and other),
P: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies) T- Tutorial includes Sessional Work(SW) (includes assignment, seminar, mini project etc.) and Self Learning (SL), C: Credits

Note: SW and SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

G) Scheme of Assessment

S.No	Board of Study	Course Code	Course Titles	Scheme of Examination					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1	Computer Science and Engineering	2000276 (022)	Computer Fundamentals and Applications	70	20	30	-	-	120
2	Computer Science and Engineering	2000292 (022)	Computer Fundamentals and Applications (Lab)	-	-	-	30	50	80

Note : i. Separate passing is must for TA component of Progressive Assessment, both for theory and practical.
ii. Separate passing is must for End Semester Exam(Theory) and End Semester Exam(Practical).

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (L), Laboratory Instruction (P), T- Tutorial includes Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.

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CO-1 Use effectively computer system and its peripherals.

(Approx. Hrs: L+P+T = 17)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO1.1 Use functions of CPU, ALU, Memory Unit and I/O Units using block diagram of Computer SO1.2 Explain purpose and function of OS in computer SO1.3 Use various file handling operations in Windows operating system. SO1.4 Describe any five important features of Windows control panel. SO1.5 Describe Green IT concept for environment ally sound computing.	LE1.1 Perform various file handling operations of Windows OS (Create, copy, rename, delete, move files and folder) LE1.2 Use accessories utilities of windows OS (Notepad, Paint etc.)	Unit-1.0 Basics of Computer System 1.1 Computer block diagram 1.1.1 Central Processing Unit (CPU), Control Unit, Arithmetic logic Unit (ALU), Memory Unit 1.1.2 Input Output Units- Monitor, Printers: Dot matrix, Laser, Inkjet, Plotters, Scanner 1.2 Data Representation 1.2.1 Bit, Byte, Nibble, Word, ASCII, BCD, EBCDIC, UNICODE 1.3 Concept of Hardware and Software 1.3.1 System software & Application Software 1.4 Operating system 1.4.1 Concepts, Purpose and its Functions 1.4.2 Operations of Windows OS 1.5 Operations of Windows OS 1.5.1 Create and name file and folders 1.5.2 Copy file, Rename and Delete of files and folders, Search files and folders 1.5.3 Install Application, Create shortcut of	<ul style="list-style-type: none"> Block Diagram of Computer System Features of Windows OS Advance Features of Windows OS Utilities Concept of Green IT

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
		application on the desktop 1.6 Windows OS Utilities 1.6.1 Windows accessories Utilities 1.6.2 Control Panel, Taskbar 1.7 Green IT Concepts: Ergonomics, Power Plans to maximize computer's performance and conserve energy, Concept of minimizing Carbon Footprint, computing ewaste its toxic constituent and Health effects, ewaste management & recycling	

SW-1 Suggested Sessional Work (SW):

a) Assignments

- Describe functions of CPU, ALU and Memory Unit using block diagram of Computer
- List different features of operating system.

b) Mini Project

- Prepare a report on different type of computer system and printers with its specifications in your computer lab.

c) Other Activities (Specify)

- A Seminar on 'Various features of Windows O.S. of computer'
- A Seminar on 'The Green IT concept for environmentally sound computing'.

CO-2 Prepare a professional document using various features of word-processing for an academic/business/industry.

(Approx. Hrs: L+P+T =20)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO2.1 Use the various features of a word processing software for preparing a professional document.	<p>LE2.1 Prepare a sample academic/ business/ industrial/ letter document applying formatting features on text like bold, italics, underline, font type, color and size.</p> <p>LE2.2 Apply bullet, and numbering feature in the above sample document</p> <p>LE2.3 Insert images and manipulate tables in the above sample document.</p> <p>LE2.4 Use mail merge feature of word processing to write and send a personalized letter or e-mail to different people at the same time such as appointment or invitation letters.</p> <p>LE2.5 Develop typing speed for documentation at a proficiency level.</p>	<p>Unit-2.0 Word Processing</p> <p>2.1 Overview of Word processor</p> <p>2.1.1 Basics of Font- Type, Size, Color, Effects like Bold, Italic, Underline, Subscript and superscript, Case changing options</p> <p>2.2 Working with Text</p> <p>2.2.1 Inserting & Deleting, Undo and Redo</p> <p>2.2.3 Copy and Moving (cutting) text within a document</p> <p>2.3 Formatting Paragraphs</p> <p>2.3.1 Lists Setting, Line spacing</p> <p>2.4 Page settings</p> <p>2.4.1 Margins Setting, Header and Footer</p> <p>2.5 Spelling and Grammatical checks</p> <p>2.6 Table and its options</p> <p>2.6.1 Inserting rows or columns, Merging and Splitting cells, Arithmetic Calculations in a Table</p> <p>2.7 Working with pictures</p> <p>2.7.1 Inserting Pictures from Files</p> <p>2.8 Using Drawings & Objects</p> <p>2.8.1 WordArt, Lines and Shapes, Modifying Drawn Objects, Formatting Drawn objects</p>	<ul style="list-style-type: none"> • Features of word-processing software • Advance features of word processing • Features for working with pictures and drawing objects

SW-2 Suggested Sessional Work (SW):

a. Assignments

- Make a report file on short cut key for different word processing commands.
- Describe mail merge feature of word processing software for sending mass letter.

b. Mini Project

- Prepare a learning material in form of a document on the sessions taken on word processing.

c. Other Activities (Specify)

- A Seminar on 'Features of Word processing Software'

CO-3 Create a spread sheet, analyze the data using different formula/ functions and represent it in different form of chart for solving academic/business / industrial problem.

(Approx. Hrs: L+P+T = 20)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO3.1 Use Spread Sheet software to create, analyze and represent it different form of charts.	<p>LE3.1 Create a sample worksheet for any academic/ business/ industrial problem. (pay bill/ pay slip/ electricity bill/ examination results/ admission list).</p> <p>LE3.2 Apply different formula and functions in the above sample sheet for analyzing data.</p> <p>LE3.3 Use graphics and auto shapes in above sample sheet.</p> <p>LE3.4 Create and manipulate charts on the analyzed data for above sample sheet.</p>	<p>Unit-3.0 Spread sheet/ Data Analysis & Chart Presentation</p> <p>3.1 Introduction to spread sheet/ Data Analysis & Graphical Presentation</p> <p>3.1.1 Introduction to data, cell address</p> <p>3.1.2 Excel Data Types</p> <p>3.2 Concept of hyperlink</p> <p>3.3 Introduction to Formatting</p> <p>3.3.1 Formatting Number, Text, Formatting Date & Time, Formatting Concept of Worksheet, Formatting Concept of Workbook</p> <p>3.4 Understanding Formulas</p> <p>3.4.1 Operators in spread sheet</p> <p>3.4.2 Operators Precedence</p> <p>3.5 Understanding Functions</p> <p>3.5.1 Common Excel Functions</p> <ul style="list-style-type: none"> Math & Trig Functions such as Sum, Round, Sqrt, Power etc. Statistical Function such as Average, Min, Max, etc. Date & Time Lookup & Reference such as transpose etc. Logical Functions such as IN, AND, OR etc. Text Function such as Upper, Lower <p>3.6 Types of Graphics</p>	<ul style="list-style-type: none"> Features of spread-sheet software Advance features of Data Analysis Type of data representation/ Charts

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Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
		3.6.1 Word Art, Auto Shapes, Images 3.7 Introduction to charts 3.7.1 Overview of different types of Charts, 3.7.2 Using different Types of Charts such as Bar Chart, Pi-Chart etc 3.8 Printing in spreadsheet 3.8.1 Print Area, set Margins, Header & Footer 3.8.2 Page Setup options	

SW-3 Suggested Sessional Work (SW):

a) Assignments

- Describe the use of Spread Sheet software to create, analyze and represent it different form of charts.

b) Mini Project

- Create a student result sheet using Spreadsheet software, analyses the data and represent it in form of chart with respect to scores of previous exams/test/ Assignment.

c) Other Activities (Specify)

- A Seminar on 'Features of Spread sheet/ Data Analysis & Chart Presentation software'

CO-4 Create a professional multimedia presentation using its various features for any academic/business/industrial application.

(Approx. Hrs: L+P+T = 19)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO4.1 Use various features of multimedia presentation software.	LE4.1 Create a sample multimedia presentation for any academic/ business/ industrial application. LE4.2 Perform various operation on above sample presentation. LE4.3 Apply formatting features like font setting, text fill, space formatting on above sample presentation. LE4.4 Apply word arts, styles, bullets and numbers on above sample	Unit-4.0 Multimedia/ Graphic Presentation 4.1 Introduction to Multimedia/Graphic Presentation package 4.1.1 Outline of an effective presentations, Starting a New Presentation Files, Saving work, Creating new Slides 4.2 Work with textboxes 4.2.1 Adjusting character spacing, Adjusting line spacing, Formatting text	<ul style="list-style-type: none"> Features of Multimedia Presentation software Advance features of Multimedia Presentation Features of drawing tools, clip art's, multimedia elements

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
	<p>presentation.</p> <p>LE4.5 Apply drawing tools, shapes object borders, object fill and effects on above sample presentation.</p> <p>LE4.6 Insert video, animation and sound files on above sample presentation.</p> <p>LE4.7 Create hyperlink and use action buttons on above sample presentation.</p> <p>LE4.8 Print the above multimedia presentation as per given format.</p>	<p>boxes,</p> <p>4.2.2 Create new Slides</p> <p>4.3 Introduction to Formatting</p> <p>4.3.1 Change a slides Layout, Applying a theme, Changing Colors, Using various types of effects, Creating and managing custom Color, Changing the background, Formatting bulleted and numbered list, Styles</p> <p>4.4 Work with Fonts</p> <p>4.4.1 Change thefont, font size, font color, Creating and managing custom font theme & Color, Using text fill</p> <p>4.5 Work with Slides</p> <p>4.5.1 Change slides Layout, Slides Master, Slide Sorter</p> <p>4.5.2 Apply& Manage theme</p> <p>4.6 Use Drawings & Objects</p> <p>4.6.1 Word Arts, Selecting, deleting, moving, copying, resizing and arranging objects, working with drawing tools, Apply shape or picture styles, Applying object borders, Apply object fill, Apply object effects, Apply object borders</p> <p>4.7 Work with Clip Art & Picture</p> <p>4.7.1 Insert Clip Art, Modify Clip Art, Insert& Editing Pictures</p> <p>4.8 Find and replace text, Correcting your spelling</p>	

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Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
		4.9 Use Tables 4.9.1 Creating a new Table, Editing a table's structure 4.10 Work with Video 4.10.1 Embed a video, Link to a video, Size a video, Video playback options 4.11 Use Animation, Sound & Effects 4.11.1 Using Custom Animation for Text & Picture 4.11.2 Configure a sound playback, Add a digital music sound track, provide Transition effects and timings, Creating hyperlinks, using action buttons	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

- Describe the potential use multimedia presentation.

b) Mini Project:

- Create a short slide show of any event organized in college.

c. Other Activities (Specify)

- A Seminar on 'Features of multimedia presentation Software

CO-5 Use Internet, Cloud services, and its security features for computing.

(Approx. Hrs: L+P+T = 20)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO5.1 Identify different type of computer Networks. SO5.2 Explain briefly wired and wireless internet connectivity.	LE5.1 Identify various types of network, its devices LE5.2 Configure Internet connection and browser setting. LE5.3 Search web content based on different criteria using search engine. LE5.4 Use email services to send	Unit-5.0 Basics of Internet & Cloud Computing 5.1 Types of Networks 5.1.1 LAN, MAN, WAN 5.2 Intranet, Internet, VPN, Wi-Fi, Bluetooth, switches 5.3 Brief of Internet Connectivity 5.4 Devices and Services	<ul style="list-style-type: none"> Internet and its services Browsers and search engines Network security and features of cloud

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Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
SO5.3 Use different types of internet services SO5.4 Identify various types of Viruses and its protection. SO5.5 Explain briefly cloud computing.	and receive emails. LE5.5 Use voice mail, newsgroup, chat and video conferencing, ftp services LE5.6 Install and configure Anti-virus/firewall on computer system	5.4.1 Dial up, Leased line, DSL Broadband, Access Point, Modem, Wi-Fi Router 5.4.2 Email, voice mail, Newsgroup, Chat, Video conferencing, File Transfer Protocol 5.5 Web Browsers URL, Web Site, http 5.6 Internet Services 5.6.1 Queries, Search Engines 5.7 Introduction to Virus & Antivirus 5.7.1 Virus & its type, Antivirus 5.7.2 Firewall 5.8 Overview of Cloud Computing	computing

SW-5 Suggested Sessional Work (SW)

a. Assignments:

- Explain Different type of networks
- List the basic features of cloud network

b. Mini Project:

Prepare report on computer network, devices, antivirus and firewall software installed in the laboratory.

c. Other Activities (Specify)

- A seminar on 'Computer Antivirus'
- A seminar on 'Computer Firewall'
- A seminar on 'Overview of Cloud Computing'

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

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I) Suggested Specification Table (For ESE of Classroom Instruction)

Unit Number	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
I	Basics of Computer System	10	16	6	32
II	Word Processing	-	6	-	6
III	Spread sheet/ Data Analysis & Chart Presentation	-	6	-	6
IV	Multimedia/Graphic Presentation	-	6	-	6
V	Basics of Internet, Cloud Services and its Security for Computing	6	10	4	20
Total		16	44	10	70

Legend: Remember, U: Understand, A: Apply and above

J) Suggested Specification Table (For ESE of Laboratory Instruction*)

S.No/ Units	List of Practicals	Assessment of Laboratory Work (Marks)			
		Performance		Viva- Voce	
		PRA	PDA		
1	i. Perform various file handling operations of Windows OS (Create, copy, rename, delete, move files and folder) ii. Use accessories utilities of windows OS (Notepad, Paint etc.)	2	2	2	30 Marks are allocated for performance under ESE
2	Prepare a sample academic/ business/ industrial/ letter document applying formatting features on text like bold, italics, underline, font type, color and size.	2	2	2	
3	Create a sample worksheet for any academic/ business/ industrial problem.(pay bill/ pay slip/ electricity bill/ examination results/ admission list).	2	2	2	
4	Create a sample multimedia presentation for any academic/ business/ industrial application.	2	2	2	
5	i. Use voice mail, newsgroup, chat and video conferencing, ftp services ii. Install and configure Anti-virus/firewall on computer system	2	2	2	
		10	10	10	

*Assessment rubric, process and product check list with rating scale need to be prepared by the course wise teachers for each experiment for conduction and assessment of laboratory experiments /practicals

Legend: PRA: Process Assessment, PDA: Product Assessment

Note: Each student at the end of semester examination of **30 Marks**; has to undertake five experiments (one from each Unit)

K) Suggested Instructional/Implementation Strategies

1. Improved Lecture
2. Tutorial

3. Case Method
4. Group Discussion
5. Industrial visits
6. Industrial Training
7. Field Trips
8. Portfolio Based Learning
9. Role Play
10. Demonstration
11. ICT Based Teaching Learning (Video Demonstration, CBT, Blog, Face book, Mobile)
12. Brainstorming
13. Others

L) Suggested Learning Resources

(a) Books

S. No.	Titles	Author	Publisher	Edition & Year
1.	Computer Fundamentals	Goel, Anita	Pearson Education, New Delhi,	2014, ISBN-13: 978-8131733097
2.	Computer Course	Ravi Kant Taxali	Tata McGraw Hills. New Delhi.	Year 2014 or latest
3.	Fundamentals of computers	V. Rajaraman, NeehariKaAdabala	PHI	6 th Edition 2014 or latest
4.	Computer Basics Absolute Beginner's Guide, Windows 10	Miller, Michael	QUE Publishing;	8th edition August 2015, ISBN: 978-0789754516 or latest
5.	The Internet Book	Douglas Comer	Prentice Hall	Year 2007 or latest
6.	Microsoft Office 2010: On Demand	Johnson, Steve	Pearson Education, New Delhi India,	-2010. ISBN :9788131770641 or latest
7.	OpenOffice.org for Dummies	Leete, Gurdy, Finkelstein Ellen, Mary Leete	Wiley Publishing, New Delhi,	2003 ISBN : 978-0764542220 or latest
8.	Computer Fundamentals	Pradeep K Sinha	BPB Publication	Year 2004 or latest

(b) Open source software and website address

- a. Fundamentals of computers- V. Rajaraman, NeeharikaAdabala https://books.google.co.in/books?id=rGjkBQAAQBAJ&dq=Fundamentals+of++computers&source=gbs_navlinks_s
- b. Computer course, Ravi Kant Taxali- https://books.google.co.in/books/about/COMPUTER_COURSE.html?id=PfHftdSmNBkC&redir_esc=y
- c. Computer Fundamentals Tutorials- https://www.arstecb.com/book_argument/com_fun.pdf
- d. Computer fundamentals, P.K. Sinha <http://www.edutechlearners.com/computer-fundamentals-p-k-sinha-free-pdf/>
- e. Microsoft office set by step Joan Lambert and Curtis Frye <https://ptgmedia.pearsoncmg.com/images/9780735699236/samplepages/9780735699236.pdf>
- f. Open Office Suit- <http://www.openoffice.us.com/download-openoffice-free.php>
- g. MS Office: <https://www.microsoft.com/en-in/learning/office-training.aspx>

- h. Open Office Training: <http://www.tutorialsforopenoffice.org/>
- i. Star Office- https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d/Special_Edition_Using_StarOffice_6_0.pdf
- j. Typing Master 10 in English for Windows: <http://www.typingmaster.com/typing-tutor/free-download.html>
- k. Hindi Typing Tutor and Master <http://www.hinditypingtutor.com/>

(c) Others

- 1. Learning Packages.
- 2. Lab Manuals.
- 3. Manufacturers' Manual
- 4. Users' Guide

M) List of Major Laboratory Equipment, Tools & Software

S. No.	Name of Equipment/Tools/Software	Broad Specifications	Relevant Practical Number
1.	Computer Network	LAN Cable, Router, Switch 30*2/Hub	LE1.1 & LE1.2
2.	Printer, Scanner, Plotter, Modem	Laser Printer, Scanner, Plotter, Modem	LE1.1 & LE1.2
3.	MS Back Office 2016 or latest	Office suit	LE2.1 to LE4.8
4.	Typing Master in English for Windows(Free download) Hindi Typing Tutor and Master (Free download)	http://www.typingmaster.com/typing-tutor/free-download.html http://www.hinditypingtutor.com/	LE2.5
5.	Open Office Suit Latest	Office suit	LE2.1 to LE4.8
6.	Internet Connectivity	Broad band/Leased Line	LE5.1 to LE5.6
7.	Anti-Virus Software & Firewall	Antivirus software And Firewall	LE5.5

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N) Mapping of POs & PSOs with Cos

Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	PO-1 Basic knowledge	PO-2 Discipline knowledge	PO-3 Experiments and practice	PO-4 Engineering Tools	PO-5 The engineer and society	PO-6 Environment and sustainability	PO-7 Ethics	PO-8 Individual and team work	PO-9 Communication	PO-10 Life-long learning	PSO-1	PSO-2
CO-1 Use computer system and its peripherals effectively for solving various engineering problems.	3	3	3	3	3	2	2	1	2	2	3	3
CO-2 Prepare a professional document using various features of word-processing for academic/business/ industry purpose.	3	3	3	3	3	1	2	2	3	2	3	3
CO-3 Create a spread sheet, analyze the data using different formula/ functions and represent it in different form of chart for solving academic/business/ industrial problem.	3	3	3	3	3	1	2	2	3	2	3	3
CO-4 Create a professional multimedia presentation using its various features for any academic/business/ industrial application.	3	3	3	3	3	1	2	2	3	2	3	3
CO-5 Use Internet, Cloud services, and its security features for computing.	3	3	3	3	3	1	2	2	3	2	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

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O) Course Curriculum Map

POs & PSOs No.	COs No. & Titles	SOs No.	Laboratory Instruction (P)	Class room Instruction (L)	Self-Learning (SL)
PO 1,2,3,4, 5,6,7, 8,9,10 PSO 1,2	CO-1 Use computer system and its peripherals effectively for solving various engineering problems.	SO1.1-SO1.5	LE1.1 LE1.2	Unit-1.0 Basics of Computer System	As mentioned in relevant pages
PO 1,2,3,4, 5,6,7, 8,9,10 PSO 1,2	CO-2 Prepare a professional document using various features of word-processing for academic/business/ industry purpose.	SO.2.1	LE2.1-LE2.5	Unit-2.0 Word Processing	
PO 1,2,3,4, 5,6,7, 8,9,10 PSO 1,2	CO-3 Create a spread sheet, analyze the data using different formula/ functions and represent it in different form of chart for solving academic/business/ industrial problem.	SO.3.1	LE3.1-LE 3.4	Unit-3.0 Spread sheet/ Data Analysis & Chart Presentation	
PO 1,2,3,4, 5,6,7, 8,9,10 PSO 1,2	CO-4 Create a professional multimedia presentation using its various features for any academic/business/ industrial application.	SO4.1	LE4.1-LE4.8	Unit-4.0 Multimedia/Graphic Presentation	
PO 1,2,3,4, 5,6,7, 8,9,10 PSO 1,2	CO-5 Use Internet, Cloud services, and its security features for computing.	SO5.1-SO5.5	LE5.1-LE5.6	Unit-5.0 Basics of Internet & Cloud Services, its security for Computing	

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- A) Course Code : 2000294(046)
 B) Course Title : Seminar & Technical Presentation(Personality Development & Leadership) skills

C) Pre-requisite Course Code and Title :

D) Rational :

Technical Writing and Presentation Skills are core skills to be developed in diploma graduates as students exchange information and convey their ideas and opinions with different stakeholders. Students in technical institutes need to be trained for this. The focus of the course is to develop a wide variety of soft skills starting from communication, to work in different environments, developing emotional sensitivity, learning creative and critical decision making, developing awareness of how to work with and negotiate with people. The key areas addressed are conversation skills, group skills, persuasion skills, presentation skills, personal grooming, positive thinking and vocational skills.

E) Course Outcomes:

CO-1 Exhibit impressive personality in society.

CO-2 Explore different Leadership skills and Team work

CO-3 Develop different skills of group discussion.

F) Scheme of Studies:

S.No	Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)			
				L	P	T	Total Credits(C) L+T+(P/2)
1	Humanities	2000294 (046)	Seminar & Technical Presentation(Personality Development & Leadership) skills	-	2	-	1

Legend: L: Classroom Instruction (Includes different instructional strategies i.e. Lecture and other), P: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies) T- Tutorial includes Sessional Work (SW) (includes assignment, seminar, mini project etc.) and Self Learning (SL), C: Credits

Note: SW and SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

G) Scheme of Assessment:

S.No	Board of Study	Course Code	Course Title	Scheme of Examination					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1	Humanities	2000294 (046)	Seminar & Technical Presentation(Personality Development & Leadership) skills	-	-	-	-	60	60

Note: i. Separate passing is must for TA component of Progressive Assessment, both for theory and practical.
 ii. Separate passing is must for End Semester Exam(Theory) and End Semester Exam(Practical).

H) Course-Curriculum Detailing:

course This curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (L), Laboratory Instruction (P), T- Tutorial includes Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.

CO-1 Exhibit impressive personality in society.

Session Outcomes (SOs)	Laboratory Instruction/Classroom Instruction (P/L)	Self Learning (SL)
SO-1.1 Understand and practice positive traits for an impressive personality.	Concept and meaning of personality 1.1 Characteristics/Qualities 1.2 Factors influencing personality Need for desirable personality 1.3 Posture and Health 1.4 Good Health diet Exercise, Personal Cleanliness, Sleep and Rest 1.5 Use of Cosmetics 1.6 Dress Code 1.7 Eye-Contact	<ul style="list-style-type: none">Motivational Movies, Videos, Lectures, Interviews, Yoga etc.,

CO-2 Explore different Leadership skills and Team work

Session Outcomes (SOs)	Laboratory Instruction/Classroom Instruction (P/L)	Self Learning (SL)
SO-2.1 Understanding Leadership & Team work	2.1 Skills for a good Leader. Different Leadership Styles Autocratic, Democratic, Ethical, Transformational, Team Leadership 2.2 Necessity of Team Work Personally, Socially, professionally and Educationally	--

CO-3 Develop different skills of group discussion.

Session Outcomes (SOs)	Laboratory Instruction/Classroom Instruction (P/L)	Self Learning (SL)
SO-3.1 Participate in Group Discussion	3.1 Weighing Positives & Negatives in Group Discussion 3.2 Dos and Don'ts of Group Discussion 3.3 Initiating, continuing and concluding a Group Discussion	--
SO-4.1 Use proper tools to manage Time in different situations.	4.1 Principles of Time Management 4.2 Criteria governing Time Management 4.3 Prioritizing work	

SW- Suggested Sessional Work (SW):

- a. **Assignments:**
Preparing skits to show Creativity, communication, critical thinking
- b. **Mini Project:**
Recorded Lectures may be played in the class and students are asked to listen and answer.
- c. **Other Activities (Specify):**
Self Introduction, Speech and Spell Test, movie clips, games, examples, story/sharing questionnaire/role play/exercises/ Task, Video/Audio recording

Note: There will be no end semester examination for laboratory instructions as well as class room instructions, and the practical activity will be assessed for term work.

I) Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

J) Suggested Learning Resources:

(a) Books :

S. No.	Title	Author	Publisher	Edition & Year
1	How to achieve success and happiness	Beau Norton	CreateSpace Independent Publishing Platform	Latest edition
2	Living English Structure	Allen	Cambridge Publications	Fifth edition(2009)
3	The Quick and Easy Way to Effective Speaking	Dale Carnegie	Amazing Reads	23 January 2018
4	English Grammar at Glance	Gnanamurali, M.	S. Chand and Co. New Delhi,	2011 ISBN:9788121929042
5	Elementary English Grammar and Composition	Agarwal N.K.	Goyal Brothers Prakashan	Latest Edition
6	Covey Sean, Seven Habit of Highly Effective Teens	Covey Sean,	Fireside Publishers, 1998.	
7	How to win Friends and Influence People	Carnegie Dale,	Simon & Schuster, New York 1998.	
8	Thomas A Harris, I am ok, You are ok	Thomas A Harris	New York-Harper and Row, 1972	
9	Emotional Intelligence, Bantam Book, 2006	Daniel Coleman	Bantam Book, 2006	
10	Chanakya's 7 Secrets of Leadership	Pillai Radhakrishnan	Jaico Publishing House	ISBN: 9788184954012, 8184954018

(b) Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [language-labs.com](http://www.language-labs.com/)
13. www.wordsworthelt.com

c) Others:

1. Learning Packages.
2. Lab Manuals.
3. Language software Manual
4. Users' Guide

K) List of Major Laboratory Equipment and Tools:

S. No.	Name of Equipment	Broad Specifications	Relevant Experiment Number
1	Computers	A complete computer system with headphones & Speakers	All
2	Soft ware	English communication software's – Globalina, A-One Solutions, Wordsworth, Spears	All
3.	Computer tables & chairs	Depending upon the size of the Language Lab	All

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L) Mapping of POs & PSOs with COs:

Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	PO-1 Basic knowledge	PO-2 Discipline knowledge	PO-3 Experiments and practice	PO-4 Engineering Tools	PO-5 The engineer and society	PO-6 Environment and sustainability	PO-7 Ethics	PO-8 Individual and team work	PO-9 Communication	PO-10 Life-long learning	PSO-1	PSO-2
CO-1 Exhibit impressive personality in society.	2	1	1	1	-	-	-	-	2	2	1	1
CO-2 Explore different Leadership skills and Team work	1	1	2	2	-	-	-	-	2	3	1	1
CO-3 Develop different skills of group discussion.	1	2	2	1					1	2	1	1

Legend: 1 – Low, 2 – Medium, 3 – High

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M) Course Curriculum Map:

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction(P)	Classroom Instruction (L)	Self Learning (SL)
PO1,2,3,4,9,10 PSO 1,2	CO-1 Exhibit impressive personality in society.	SO1.1	LE1.1 LE1.2 LE1.3 LE1.4 LE1.5 LE1.6 LE1.7		As mentioned in relevant pages
PO 1,2,3,4,9,10 PSO 1,2	CO-2 Explore different Leadership skills and Team work	SO2.1	LE2.1 LE2.2		
PO 1,2,3,4,9,10 PSO 1,2	CO-3 Develop different skills of group discussion.	SO3.1 SO4.1	LE3.1 LE3.2 LE3.3 LE4.1 LE4.2 LE4.3		

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