



# GraphicEra

**Deemed to be University**

**Accredited by NAAC with Grade A**

Approved by AICTE, Ministry of HRD, Govt. of India

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**BACHELOR OF TECHNOLOGY**

**ALL BRANCHS (Except Biotech)**

**B.Tech (All Branches except Biotech)**  
**CURRICULUM STRUCTURE AND EVALUATION SCHEME W.E.F 2021-22**

**SEMESTER: I**

COURSE MODULE Physics Group				TEACHING PERIODS			WEIGHTAGE : EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
THU101	Professional Communication	FC	2	2	-	-	25	25	50	100
TPH101	Engineering Physics	FC	3	3	-	-	25	25	50	100
TMA101	Engineering Mathematics-I	FC	4	3	1	-	25	25	50	100
TEE101	Basic Electrical Engineering	FC	4	3	1	-	25	25	50	100
TCS101	Fundamental of Computer & Introduction to Programming	FC	3	3	-	-	25	25	50	100
THF101	Healthy Living & Fitness	HF	1	1	-	-	50	-	50	100
PPH151	Physics Lab	FC	1	-	-	2	25	25	50	100
PEE151	Basic Electrical Engineering Lab.	FC	1	-	-	2	25	25	50	100
PME151	Workshop and Manufacturing Practices	FC	3	1	-	4	25	25	50	100
PCS151	Computer Lab-I	FC	2	-	-	4	25	25	50	100
GP101	General Proficiency	GP	1	-	-	-	-	-	100	100
<b>Total</b>			<b>25</b>	<b>16</b>	<b>2</b>	<b>12</b>	<b>275</b>	<b>225</b>	<b>600</b>	<b>1100</b>

COURSE MODULE Chemistry Group				TEACHING PERIODS			WEIGHTAGE : EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
THU101	Professional Communication	FC	2	2	-	-	25	25	50	100
TCH101	Engineering Chemistry	FC	3	3	-	-	25	25	50	100
TMA101	Engineering Mathematics-I	FC	4	3	1	-	25	25	50	100
TEC101	Basic Electronics Engineering	FC	3	3	-	-	25	25	50	100
TEV101	Environmental Science	EV	2	2	-	-	25	25	50	100
TCS101	Fundamental of Computer & Introduction to Programming	FC	3	3	-	-	25	25	50	100
PCH151	Chemistry Lab	FC	1	-	-	2	25	25	50	100
PME153	Engg. Graphics and Design Lab.	FC	3	1	-	4	25	25	50	100
PCS151	Computer Lab - I	FC	2	-	-	4	25	25	50	100
PEC151	Basic Electronics Engineering Lab.	FC	1	-	-	2	25	25	50	100
GP101	General Proficiency	GP	1	-	-	-	-	-	100	100
<b>Total</b>			<b>25</b>	<b>17</b>	<b>1</b>	<b>12</b>	<b>250</b>	<b>250</b>	<b>600</b>	<b>1100</b>

## SEMESTER II

COURSE MODULE Physics Group				TEACHING PERIODS			WEIGHTAGE : EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
THU201	Advanced Professional Communication	FC	2	2	-	-	25	25	50	100
TPH201	Engineering Physics	FC	3	3	-	-	25	25	50	100
TMA201	Engineering Mathematics-II	FC	4	3	1	-	25	25	50	100
TEE201	Basic Electrical Engineering	FC	4	3	1	-	25	25	50	100
TCS201	Programming for Problem Solving	FC	3	3	-	-	25	25	50	100
THF201	Healthy Living & Fitness	HF	1	1	-	-	50	-	50	100
PPH251	Physics Lab	FC	1	-	-	2	25	25	50	100
PEE201	Basic Electrical Engineering Lab.	FC	1	-	-	2	25	25	50	100
PME251	Workshop and Manufacturing Practices	FC	3	1	-	4	25	25	50	100
PCS251	Computer Lab-II	FC	2	-	-	4	25	25	50	100
GP201	General Proficiency	GP	1	-	-	-	-	-	100	100
<b>Total</b>			<b>25</b>	<b>16</b>	<b>1</b>	<b>12</b>	<b>275</b>	<b>225</b>	<b>600</b>	<b>1100</b>

COURSE MODULE Chemistry Group				TEACHING PERIODS			WEIGHTAGE : EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
THU201	Advanced Professional Communication	FC	2	2	-	-	25	25	50	100
TCH201	Engineering Chemistry	FC	3	3	-	-	25	25	50	100
TMA201	Engineering Mathematics-II	FC	4	3	1	-	25	25	50	100
TEC201	Basic Electronics Engineering	FC	3	3	-	-	25	25	50	100
TEV201	Environmental Science	EV	2	2	-	-	25	25	50	100
TCS201	Programming for Problem Solving	FC	3	3	-	-	25	25	50	100
PCH251	Chemistry Lab	FC	1	-	-	2	25	25	50	100
PME253	Engg. Graphics and Design Lab.	FC	3	1	-	4	25	25	50	100
PCS251	Computer Lab - II	FC	2	-	-	4	25	25	50	100
PEC251	Basic Electronics Engineering Lab.	FC	1	-	-	2	25	25	50	100
GP201	General Proficiency	GP	1	-	-	-	-	-	100	100
<b>Total</b>			<b>25</b>	<b>17</b>	<b>1</b>	<b>12</b>	<b>250</b>	<b>250</b>	<b>600</b>	<b>1100</b>

**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN**

**CURRICULAR STRUCTURE AND SCHEME**

**FOR**

**B. TECH (All Branches except Biotech)**

**(BATCH 2019 & ONWARDS)**

**SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
TMA 101	Engineering Mathematics-I	Core	4	3	1	0	25	25	50	100
TMA 201	Engineering Mathematics-II	Core	4	3	1	0	25	25	50	100
TOTAL			8	6	1	0				200

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I

Name of Department: - **Mathematics**

1. Subject Code: **TMA101** Course Title: **Engineering Mathematics-I**

2. Contact Hours: L: **3** T: **1** P: **0**

3. Examination Duration (Hrs): Theory **3** Practical **0**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **4**

6. Semester: **Autumn**

7. Subject Area: **Core Course**

8. Pre-requisite: **Basic Knowledge of Mathematics.**

9. <b>Course Outcome:</b>	<ul style="list-style-type: none"><li>• Understand the concept of matrices.</li><li>• Solve the system of linear equations.</li><li>• Understand the concept of differential calculus and apply to various discipline of Engineering.</li><li>• Analyze the maximum / minimum values of functions of two or more variables with its application to engineering systems.</li><li>• Solve the multiple integrals and apply to find the area and volumes.</li><li>• Utilize the vector calculus in different engineering systems.</li></ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>MATRICES</b> Elementary row and column transformations. Rank of a matrix, linear dependency and independency, Consistency of a system of linear equations, Hermitian, Skew-Hermitian, Unitary matrices, Characteristic equation, Cayley-Hamilton theorem, Eigen values and Eigen vectors, Diagonalization.	10
2	<b>CALCULUS-I</b>	12

	Sequence and Series: Leibnitz test, Cauchy Root test and Ratio test  Introduction of differential calculus, higher order derivatives, Successive Differentiation, Leibnitz's theorem, Limits, Continuity and Differentiability of two variables, Partial Differentiation, homogeneous function, Euler's theorem, Taylor's and Maclaurin's expansions of one and two variables.	
3	<b>CALCULUS-II</b>  Extrema (Maxima/ Minima) of functions of two variables, method of Lagrange's multipliers. Introduction of Jacobian, properties of Jacobian, Jacobian of implicit and explicit functions, functional dependence.	7
4	<b>MULTIPLE INTEGRALS</b>  Introduction to integration, Double and triple integrals, Change of order of integration, Beta and Gamma functions. Applications to area, volume, Dirichlet's integral.	7
5	<b>VECTOR CALCULUS</b>  Introduction to Vectors, Gradient, Divergence and Curl of a vector and their physical interpretation, Line, Surface and Volume integrals, Green's, Stoke's and Gauss's divergence theorem (without proof).	9
	Total	<b>45</b>

#### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
	<b>Text Books</b>	
1.	C. B. Gupta, S. R. Singh and Mukesh Kumar, "Engineering Mathematics for Semesters I and II" McGraw Hill Education, First edition	2015
2.	Grewal, B. S., "Higher Engineering Mathematics", 40e, Khanna Publications, India	2009
	<b>Reference Books</b>	
1.	Ramana, B. V., "Higher Engineering Mathematics", Tata McGraw Hill publications	2007
2.	R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics,	2004

	Narosa Publication.	
3.	Kreyszig, Erwin., "Advanced Engineering Mathematics", 9e, Wiley Publications	2006

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam
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# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER II

Name of Department: - **Mathematics**

1. Subject Code: **TMA 201** Course Title: **Engineering Mathematics-II**

2. Contact Hours: L: **3** T: **1** P: **0**

3. Examination Duration (Hrs): Theory **3** Practical **0**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **4**

6. Semester: **Spring**

7. Subject Area: **Core Course**

8. Pre-requisite: **Basic Knowledge of Mathematics.**

<b>9. Course Outcome:</b>	<ul style="list-style-type: none"><li>• Solve the linear ordinary differential equations.</li><li>• Apply the Laplace transforms in linear and simultaneous linear differential equations.</li><li>• Apply the Fourier series for signal analysis in various engineering discipline.</li><li>• Classify the partial differential equations and to solve homogeneous partial differential equations with constant coefficients.</li><li>• Apply method of separation of variables to solve 1D heat, wave and 2D Laplace equations.</li><li>• Find the series solution of differential equations and comprehend the Legendre's polynomials, Bessel functions and its related properties.</li></ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>DIFFERENTIAL EQUATION</b> Ordinary differential equation of first order (Exact and reducible to exact differential equations), linear differential equations of nth order with constant coefficients, Complementary functions and particular integrals, Euler Homogeneous differential equation,	8



	Method of variation of parameters and its applications.	
2	<b>LAPLACE TRANSFORM</b> Introduction of Laplace Transform, Its Existence theorem and properties, Laplace transform of derivatives and integrals, Inverse Laplace transform, Laplace transform of periodic functions, Unit step function and Dirac delta function, Convolution theorem, Applications to solve simple linear and simultaneous linear differential equations.	10
3	<b>FOURIER SERIES</b> Periodic functions, Fourier series of periodic functions of period $2\pi$ , Euler's formula, Fourier series having arbitrary period, Change of intervals, Even and odd functions, Half range sine and cosine series.	7
4	<b>PARTIAL DIFFERENTIAL EQUATIONS</b> Introduction to partial differential equations, Solution of linear partial differential equations with constant coefficients of second order and their classifications: parabolic, hyperbolic and elliptic partial differential equations. Method of separation of variables for solving partial differential equations, one dimensional Wave and heat conduction equations, Laplace equation in two dimensions.	12
5	<b>SPECIAL FUNCTION</b> Series solution of differential equations, Legendre's differential equations and Polynomials, Bessel's differential equations and Bessel's Functions, Recurrence relations, Generating Functions, Rodrigue's formula.	9
	Total	<b>45</b>

#### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
	<b>Text Books</b>	
1.	C. B. Gupta, S. R. Singh and Mukesh Kumar, "Engineering Mathematics for Semesters I and II" McGraw Hill Education, First edition.	2015

2.	C. Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya	1996
	<b>Reference Books</b>	
1.	E. Kreyszig, Advanced Engineering Mathematics, Wiley India.	2006
2.	R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication.	2004
3.	B. S. Grewal, Higher Engineering Mathematics, Khanna Publications	2009

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam
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## GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## CURRICULAR STRUCTURE AND SCHEME

**FOR**

## **B.TECH (ELECTRONICS AND COMMUNICATION ENGINEERING)**

**(BATCH 2019 & ONWARDS)**

## SEMESTER I & II

[illegible]

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I

Name of Department: - **Computer Science and Engineering**

1. Subject Code: **TCS 101** Course Title:

Course Title: **Fundamental of computer and introduction to programming**

2. Contact Hours: L: **3** T: **0** P: **0**

3. Examination Duration (Hrs): Theory **3** Practical **0**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **3**

6. Semester: **Autumn**

7. Subject Area: **Core Course**

8. Pre- requisite: **Basic Knowledge of Mathematics**

9. <b>Course Outcome:</b>	<ul style="list-style-type: none"><li>• Learn the concepts of IT and understand the fundamentals of basic building blocks of computer science.</li><li>• Understand basic data types and syntax of C programming..</li><li>• Propose solution to problem by using tools like algorithm and flowcharts.</li><li>• Analyze and select best possible solution for decision-based problems using decision making skills.</li><li>• Develop the aptitude to solve iterative problems using different types of looping statements.</li><li>• Implement complex problem as a collection of sub problems by applying modularization in applications using functions.</li></ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>UNIT- I</b>	8

	<p>Generation of computers, Computer system memory hierarchy, Input/Output, RAM/ROM, Software &amp; Hardware, Understand bit, byte, KB, MB, GB and their relations to each other, Operating System overview, Computer Networks Overview</p> <p>Algorithms and Flow Charts – Examples of Flow charts for loops and conditional statements</p>	
2	<p><b>UNIT- 2</b></p> <p>First C program - Hello world, How to open a command prompt on Windows or Linux</p> <p>How to read and print on screen - printf(),scanf(),getchar(), putchar()</p> <p>Variables and Data types - Variables, Identifiers, data types and sizes, type conversions, difference between declaration and definition of a variable, Constants</p> <p>Life of a C program (Preprocessing, Compilation, Assembly, Linking, Loading, Execution), Compiling from the command line, Macros,</p> <p>Operators – equality and assignment, Compound assignment operators, Increment and decrement operators, Performance comparison between pre and post increment/decrement operators, bitwise operators (AND, OR, NOT and XOR), Logical Operators, comma operator, precedence and associativity, Logical operators (AND, OR),</p>	10
3	<p><b>UNIT- III</b></p> <p><b>Conditional statements:</b> if statement, if-else statement, ternary statement or ternary operator, nested if-else statement, switch statement, Difference between performance of if else and switch, Advantages of if else and switch over each other</p> <p><b>Loops:</b> ‘for’ loops, ‘while’ loops, ‘do while’ loops, entry control and exit control, break and continue, nested loops</p>	8
4	<p><b>UNIT- IV</b></p> <p><b>Arrays:</b> Single and Multi-dimensional arrays, Initializing arrays, computing address of an element in array, row major and column major form of an array, character strings and arrays, segmentation fault, bound checking, Sorting Algorithms – Bubble sort, insertion sort, selection sort</p>	10
5	<p><b>UNIT- V</b></p>	7

	<p><b>Functions:</b> Function prototype, function return type, signature of a function, function arguments, call by value, Function call stack and Activation Records, Recursion v/s Iteration, passing arrays (single and multi-dimensional) to functions,</p> <p><b>Storage classes:</b> Automatic, Static, Register, External, Static and Dynamic linking implementation, C program memory (show different areas of C program memory and where different type of variables are stored), scope rules</p>	
	Total	<b>43</b>

### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
	<b>Text Books</b>	
1.	<ul style="list-style-type: none"> <li>Peter Prinz, Tony Crawford, "C in a Nutshell", 1st Edition, Oreilly Publishers,</li> </ul>	2011
2.	<ul style="list-style-type: none"> <li>Peter Norton, "Introduction to computers", 6th Edition, TMH,</li> </ul>	2009
	<b>Reference Books</b>	
1.	<ul style="list-style-type: none"> <li>Steve Oualline, "Practical C programming", 3rd Edition, Orielly Publishers, 2011.</li> </ul>	2011
2.	<ul style="list-style-type: none"> <li>Brian W Kernighan, Dennis M Ritchie, "The C Programming Language", 2nd Edition, Prentice Hall, 1988. R3. Herbert Schildt, "C: The Complete Reference", 4th Edition. TMH, 2000.</li> </ul>	2000
3.	<ul style="list-style-type: none"> <li>E. Balagurusamy, "Programming in ANSI C", 6th Edition, McGraw Hill</li> </ul>	2015
4.	<ul style="list-style-type: none"> <li>Yashwant Kanetkar, "Let Us C", 8th Edition, BPB Publication</li> </ul>	2007

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam
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# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER II

Name of Department: - **Computer Science and Engineering**

1. Subject Code: **TCS 201** Course Title:

Course Title: **Programming for Problem Solving**

2. Contact Hours: L: **3** T: **0** P: **0**

3. Examination Duration (Hrs): Theory **3** Practical **0**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **3**

6. Semester:

7. Subject Area: **Core Course**

8. Pre- requisite: **Basic Knowledge of Mathematics and Computer Fundamentals**

9. <b>Course Outcome:</b>	<ul style="list-style-type: none"><li>• Learn and apply concepts of strings for providing solutions to homogenous collection of data types</li><li>• Propose solution to problem by using tools like algorithm and flowcharts.</li><li>• Apply the concept of pointers to optimize memory management by overcoming the limitations of arrays.</li><li>• Process and analyze problems based on heterogeneous collection of data using structures.</li><li>• Apply concepts of file handling to implement data storage and retrieval tasks.</li><li>• Implement the basic real life problems using python</li></ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>UNIT- I</b> Strings – Declaration of strings, Initialization of strings using arrays and	6

	pointers, Standard library functions of <string.h> header file, Null-terminated strings, Char arrays and pointers, Pointers and Strings, comparing two strings, find substring in a string, tokenizing a string with strtok() function, pointer-based string-conversion function – atoi()	
2	<b>UNIT- 2</b> Pointers –Basic of pointers and addresses, Pointers and arrays, Pointer arithmetic, passing pointers to functions, call by reference,  Dynamic memory management in C - malloc(), calloc(), realloc(), free(), memory leak,  Dangling, Void, Null and Wild pointers  Structures - Structures, array of structures, structure within structure, union, typedef, self-referential structure, pointer to structure	10
3	<b>UNIT- III</b>  <b>File Handling</b> - Opening or creating a file, closing a file, File modes, Reading and writing a text file using getc(), putc(), fprintf(), fscanf(), fgets(), fputs(), Difference between append and write mode, Reading and writing in a binary file, counting lines in a text file, Search in a text file, Random file accessing methods- feof(), fseek(), ftell() and rewind() functions.	8
4	<b>UNIT- IV</b> <b>Introduction to Python-</b>  History of Python, Need of Python Programming, Python features, Installation of Python in Windows and Linux, First Python Program, Running python Scripts, Variables, Reserved words, Lines and indentation, Quotations, Comments, Input output.  Data Types, Operators and Expressions: Standard Data Types – Numbers, strings, Boolean, Operators – Arithmetic Operators, comparison Operators, assignment Operators, logical Operators, Bitwise Operators.	10
5	<b>UNIT- V</b> Control flow – if, if-elif-else, for, while, break, continue, pass, range(), nested loops,  Data structures – List, Tuple, Dictionary	10



	File Handling – Reading text file, writing text file, copying one file to another	
	Total	<b>44</b>

### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
	<b>Text Books</b>	
1.	<ul style="list-style-type: none"> <li>Peter Prinz, Tony Crawford, "C in a Nutshell", 1st Edition, Oreilly Publishers,</li> </ul>	2011
2.	<ul style="list-style-type: none"> <li>Yashwant Kanetkar, "Let Us C", 8th Edition, BPB Publication</li> </ul>	2007
	<b>Reference Books</b>	
1.	<ul style="list-style-type: none"> <li>Steve Oualline, "Practical C programming", 3rd Edition, Orielly Publishers, 2011.</li> </ul>	2011
2.	<ul style="list-style-type: none"> <li>Brian W Kernighan, Dennis M Ritchie, "The C Programming Language", 2nd Edition, Prentice Hall, 1988. R3. Herbert Schildt, "C: The Complete Reference", 4th Edition. TMH, 2000.</li> </ul>	2000
3.	<ul style="list-style-type: none"> <li>E. Balagurusamy, "Programming in ANSI C", 6th Edition, McGraw Hill</li> </ul>	2015

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam
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**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN**  
**CURRICULAR STRUCTURE AND SCHEME**  
**FOR**  
**B. TECH (PROFESSIONAL COMMUNICATION)**  
**(BATCH 2021 & ONWARDS)**  
**SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
THU 101	Professional Communication	Core	2	2	0	0	25	25	50	100
THU 201	Advanced Professional Communication	Core	2	2	0	0	25	25	50	100
	<b>TOTAL</b>		<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>				<b>200</b>

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I

Name of Department: - Professional Communication

1. Subject Code: **THU 101** Course Title: **Professional Communication**

2. Contact Hours: L: **2** T: **0** P: **0**

3. Examination Duration (Hrs): Theory **3** Practical **0**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **2**

6. Semester: **Autumn/Spring**

7. Subject Area: **Core Course**

8. Pre-requisite: **Basic Grammar**

9. <b>Course Outcome:</b>	<ul style="list-style-type: none"><li>• Comprehend grammatical rules so that it is easier for them to converse and write in correct English</li><li>• Enhance their speaking skills through improvement in their vocabulary.</li><li>• Develop an understanding of effective nonverbal expressions and speaking skills which will instill in them the confidence of a good speaker.</li><li>• Demonstrate advanced interpersonal communication, business etiquette and relationship building skills</li><li>• Use the skills and knowledge of communication in their professional life and in career building exercise.</li></ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>FUNCTIONAL GRAMMAR</b> Parts of speech, Different verb forms, Identification of tenses, Formation of sentences using different form of tenses, Usage of parts of speech, Spotting errors (based on Parts of Speech), Concord: Agreement of verb with subject and tense	15

2	<b>VOCABULARY BUILDING</b> One-word substitution, Synonyms, Antonyms, Homonyms, Avoiding Indianism in usage of English language	4
3	<b>COMMUNICATION</b> Introduction to communication, Non-verbal aspects, Etiquette of telephone conversation, Role play: Mock Sessions	4
4	<b>EFFECTIVE HANDLING OF ISSUES</b> Use of concept of small talks, Giving and receiving feedback, Handling complaints effectively	3
5	<b>WRITTEN COMMUNICATION</b> Memo writing, Notice and Report writing, Agenda, Minutes of the meeting	4
Total		<b>30</b>

#### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
<b>Textbooks</b>		
1.	R. P. Singh, <i>Professional Communication</i> , Oxford University Press	2001
2.	M.K. Sehgal and Vandana Khetarpal, <i>Business Communication</i> , Excel Books	2007
3.	Malti Agarwal, <i>Basic Technical Communication-I</i> , Krishnan Prakashan	2014
4.	Chetanand Singh, <i>English Is Easy</i> , BSC Publishing Co. Pvt. Ltd.	2018
<b>Reference Books</b>		
1.	<i>Oxford Thesaurus of English</i> , Oxford University Press, 3 <sup>rd</sup> Edition	2010
2.	Daniel Jones, <i>Cambridge English Pronouncing Dictionary</i> , Cambridge University Press, 18 <sup>th</sup> Edition	2012

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam
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# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER II

Name of Department: - Professional Communication

1.	Subject Code:	<b>THU 201</b>	Course Title:	<b>Advanced Professional Communication</b>		
2.	Contact Hours:	L: <b>2</b>	T: <b>0</b>	P: <b>0</b>		
3.	Examination Duration (Hrs):	Theory <b>3</b>	Practical	<b>0</b>		
4.	Relative Weight:	CWA <b>25</b>	PRS <b>0</b>	MSE <b>25</b>	ESE <b>50</b>	PRE <b>0</b>
5.	Credits:	<b>2</b>				
6.	Semester:	<b>Autumn/Spring</b>				
7.	Subject Area:	<b>Core Course</b>				
8.	Pre-requisite:	<b>Professional Communication</b>				

9. <b>Course Outcome:</b>	<ul style="list-style-type: none"> <li>Understand and correctly apply rules of grammar for enhancing writing and interpersonal skills.</li> <li>Develop clear thinking, ability to express and create coherence and unity in writing.</li> <li>Use correct vocabulary in spoken and written English.</li> <li>Evaluate and assess the speaking patterns of self and others to excel in interviews and extemporaneous speaking.</li> <li>Use very effectively the principles of business correspondence with a range of business audience and how to give an impressive account of self through CVs and job applications.</li> </ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>WRITING SKILLS</b> Précis writing: Do's and don'ts, Paragraph Writing (150 words) – Descriptive, Imaginative, Analytical, and Informative, Essay writing (300 words)	6
2	<b>ADVANCED VOCABULARY</b> Idioms and phrases, Phrasal Verbs, Oxymorons	3

3	<b>SOFT SKILLS</b> Interviews- definition, purpose, preparation, types, dos and don'ts, simulation exercise, Extempore speaking: simulation exercises, Art of conversation in formal settings: simulation exercises, JAM session: simulation exercise, Group discussion: dos and don'ts, simulation exercise	7
4	<b>TECHNICAL WRITING- I</b> Technical Report writing (Project report, feasibility report, research report), Research paper writing (format, RM), Technical Proposal writing (format, structure, types)	8
5	<b>TECHNICAL WRITING-II</b> Principles of business correspondence, Drafting CVs, job applications, Presentation skills	6
	Total	<b>30</b>

#### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
	<b>Textbooks</b>	
1.	Rajhans Gupta, Varini Gupta, <i>Professional Communication</i> , Pragati Prakashan, 10 <sup>th</sup> Edition	2018
2.	M.K. Sehgal and Vandana Khetarpal, <i>Business Communication</i> , Excel Books	2007
3.	Malti Agarwal, <i>Basic Technical Communication-I</i> , Krishnan Prakashan	2014
4.	Chetananand Singh, <i>English Is Easy</i> , BSC Publishing Co. Pvt. Ltd.	2018
	<b>Reference Books</b>	
1.	<i>Oxford Thesaurus of English</i> , Oxford University Press, 3 <sup>rd</sup> Edition	2010
2.	John Ayto, <i>Oxford Dictionary of English Idioms</i> , Oxford University Press, 3 <sup>rd</sup> Edition	2010

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam
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**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN**  
**CURRICULAR STRUCTURE AND SCHEME**  
**FOR**  
**B.TECH (ENVIRONMENTAL SCIENCE)**  
**(BATCH 2016 & ONWARDS)**  
**SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
TEV 101/201	Environmental Science	Core	2	2	0	0	25	25	50	100

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I and II

Name of Department: - **Environmental Science**

1. Subject Code: **TEV101/201** Course Title: **Environmental Science**
2. Contact Hours: L: **2** T: **0** P: **0**
3. Examination Duration (Hrs): Theory **3** Practical **0**
4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**
5. Credits: **2**
6. Semester: **Autumn/Spring**
7. Subject Area: **Core Course**
8. Pre-requisite: **Basic Knowledge of Science**

<b>9. Course Outcome:</b>	<ol style="list-style-type: none"><li>1. To create environmental awareness and knowledge.</li><li>2. To encourage participation in environmental conservation practices.</li><li>3. To develop critical thinking and apply those to the analysis of a problem or question related to the environment.</li><li>4. To evaluate impact of various human induced activities on the environment .</li><li>5. To design possible solutions to the real environmental problems.</li><li>6. To create research and innovation related with different aspects of environmental science.</li></ol>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>Environmental Science and Ecosystem</b> <b>a.</b> Definition of Environmental Science, multidisciplinary nature, Objective, scope and importance. <b>b.</b> Concept of an ecosystem, structure and function, energy flow, ecological succession, food chains, food webs, ecological pyramids. <b>c.</b> Introduction, types, characteristic features, structure and function	8



	<p>of the following ecosystem:</p> <ul style="list-style-type: none"> <li>• Forest ecosystem</li> <li>• Grassland ecosystem</li> <li>• Desert ecosystem</li> <li>• Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)</li> </ul>	
2	<p><b>Natural Resources and Biodiversity</b></p> <p>a. Renewable and non- renewable resources.</p> <p>b. Natural resources and associated problems:</p> <ul style="list-style-type: none"> <li>• <b>Forest resources:</b> Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people.</li> <li>• <b>Water Resources:</b> Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams – benefits and problems, water conservation, rainwater harvesting, watershed management.</li> <li>• <b>Mineral Resources:</b> Use and exploitation, environmental effects of extracting and using mineral resources, case studies.</li> <li>• <b>Food Resources:</b> World food problems, Changes in land use by agriculture and grazing, Effects of modern agriculture, Fertilizer/ pesticide problems, Water logging and salinity</li> <li>• <b>Energy Resources:</b> Increasing energy needs, Renewable/ non renewable, Use of Alternate energy sources, urban problems related to energy, Case studies</li> <li>• <b>Land Resources:</b> Land as a resource, land degradation, man-induced land-slides, soil erosion and desertification, wasteland reclamation</li> </ul> <p>c. Role of an individual in conservation of natural resources, equitable use of resources for sustainable lifestyles.</p> <p>d. Definition of biodiversity, levels of biodiversity, value of biodiversity, threats to biodiversity (habitat loss, poaching of wildlife, man-wildlife conflicts).</p> <p>e. Biodiversity at global, national and local levels, India as a biodiversity nation, biogeographical classification of India, hotspots of biodiversity.</p> <p>f. Endangered and endemic species of India.</p> <p>g. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.</p>	16
3	<p><b>Environmental Pollution</b></p> <p>a. Definition, causes, effects and control measures of Air Pollution,</p>	8

	<p>water pollution, soil pollution, marine pollution noise pollution, thermal pollution, nuclear hazards.</p> <p><b>b.</b> Solid waste Management: causes, effects and control measures of urban and industrial wastes.</p> <p><b>c.</b> Role of an individual in prevention of pollution, pollution case studies, pollution case studies.</p>	
4	<p><b>Important Environmental and Social Issues, Management and Legislation</b></p> <p><b>a.</b> Climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocaust. Case studies.</p> <p><b>b.</b> Sustainable development, Resettlement and rehabilitation of people (its problems and concerns, case studies), Environmental ethics (issues and possible solutions), consumerism and waste products.</p> <p><b>c.</b> Disaster management: floods, earthquake, cyclone and landslides.</p> <p><b>d.</b> Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.</p> <p><b>e.</b> Issues involved in enforcement of environmental legislation, Public Awareness.</p> <p><b>f.</b> Population growth (variation among nation), Population explosion (family welfare programme), Environment and human health, human rights, value education, HIV/ AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, case studies.</p>	8
5	<p><b>Field work</b></p> <p><b>a.</b> Visit to a local area to document environmental assets- river/ forest/ grasslands/ hill /mountain.</p> <p><b>b.</b> Visit to a local polluted site- Urban/ Rural/ Industrial/ Agricultural.</p> <p><b>c.</b> Study of common plants, insects, birds.</p> <p><b>d.</b> Study of simple ecosystems- pond, river, hill slopes, etc.</p>	
	Total	<b>40</b>

**11. Suggested Books:**

<b>SL. No.</b>	<b>Name of Authors/Books/Publishers</b>	<b>Year of Publication/ Reprint</b>
	<b>Text Books</b>	
1.	Deswal, S. & Deswal A.: A Basic Course In Environmental Studies; Dhanpat Rai & Co.	2013
2.	Srivastava Smriti: Environmental Studies; Katson books.	2012
	<b>Reference Books</b>	
1.	Joseph K. & Nagendran R.: Essentials of Environmental studies; Pearson Edition	2005
2.	Santra S. C., Environmental Science; Central Book Agency.	2011

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam
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# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## CURRICULAR STRUCTURE AND SCHEME FOR

**B. TECH (SEMESTER I & II)**

**(BATCH 2019 & ONWARDS)**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
LABORATORY AND OTHERS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
PME153/253	Engineering Graphics and Design Lab	Core	3	1	0	4	25	25	50	100

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I and II

Name of Department: Mechanical Engineering

1. Subject Code: **PME 153-253** Course Title: **Engineering Graphics & Design**

2. Contact Hours: L: **1** T: **0** P: **4**

3. Examination Duration (Hrs): Theory **0** Practical **3**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **3**

6. Semester: **Autumn/Spring**

7. Subject Area: **Core Course**

8. Pre-requisite: No prerequisites

### 9. Course Outcomes:

- CO1. Prepare Engineering drawings as per BIS conventions.
- CO2. Prepare Computer generated drawings using CAD software.
- CO3. Use the knowledge of Orthographic projections to represent engineering information/Concepts.
- CO4. Prepare isometric drawings of simple objects and also have an exposure to solid modeling.

### 10. Detailed Syllabus

S.L. No.	CONTENTS	Contact Hrs
1	<b>Introduction to Computer Aided Sketching</b> Introduction, Drawing Instruments and their uses, BIS conventions, lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar, and description of most commonly used tool bars, navigational tools. Coordinate system and reference planes. Definitions of HP, VP, RPP& LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line convention, material conventions and lettering. Computer Aided Design(CAD) software: Modeling of parts and Assemblies.	10

2	<b>Orthographic projections of points, lines and planes:</b> Introduction, Definitions - Planes of projection, reference line and conventions employed. First angle and Third angle projection. <i>Projections of points</i> in all the four quadrants. <i>Projection of lines</i> (located in first quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems) <i>Projection of planes:</i> triangle, square, rectangle, pentagon, hexagon, and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates.)	25
3	<b>Projections of Solids:</b> Projections of right regular prisms, pyramids and cones with axis inclined to both the planes. (Solids resting on HP only)	10
4	<b>Development of lateral surfaces of solids:</b> Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. Development of lateral surfaces of above solids, their truncations.	10
5	<b>Isometric Projections:</b> Principles of Isometric projection - Isometric Scale, Isometric Views, Conventions, Isometric views of planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice - Versa.	10
6	<b>Demonstration of a Simple Team Design Project that Illustrates</b> Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels.	10
<b>CAD Softwares:</b> 1. AUTOCAD 2. CREO 2.0		
<b>Total</b>		<b>75</b>

#### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication/Reprint
<b>Text Books</b>		
1.	Engineering Graphics- K.R. Gopalakrishna, 32 <sup>nd</sup> edition, - Subash Publishers, Bangalore.	2005
2.	Computer Aided Engineering Drawing – S. Trymbaka Murthy, - International Publishing house Pvt. Ltd., New Delhi, 3 <sup>rd</sup> revised edition.	2006
<b>Reference Books</b>		
1.	Engineering Drawing- N.D. Bhatt and V.M. Panchal, 48th edition, Charotar publishing House, Gujarat.	2005

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam
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**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN****CURRICULAR STRUCTURE AND SCHEME****FOR****B.TECH (Engineering Chemistry)****(BATCH 2021 & ONWARDS)****SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
TCH 101/201	Engineering Chemistry	Core	3	3	0	0	25	25	50	100
LABORATORY AND OTHERS										
PCH 151/251	Chemistry Lab	Core	1	0	0	2	25	25	50	100
	TOTAL		4	3	0	2				200

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I and II

Name of Department: - **Chemistry**

1. Subject Code: **TCH101/201** Course Title: **Engineering Chemistry**
2. Contact Hours: L: **3** T: **0** P: **0**
3. Examination Duration (Hrs): Theory **3** Practical **0**
4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**
5. Credits: **3**
6. Semester: **Autumn/Spring**
7. Subject Area: **Core Course**
8. Pre-requisite: **Basic Knowledge of Chemistry.**

<b>9. Course Outcome:</b>	<ul style="list-style-type: none"><li>• acquire knowledge of structure and properties of molecules based on bonding and spectroscopic techniques</li><li>• understand the chemistry of purification of water and its industrial and domestic application</li><li>• classify various types of polymers and their applications</li><li>• Interpret and distinguish between the different types of conventional and non-conventional fuels</li><li>• apply the basic principles of electrochemistry in different electrochemical cells, corrosion control, fuel cells and industrial applications</li></ul>
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### 10. Details of the Course:

UNIT	CONTENTS	Contact Hrs
<b>Unit - I</b>	<b>MOLECULAR STRUCTURE AND SPECTROSCOPIC TECHNIQUES</b>  Molecular Orbital Theory, Formation of homo and heteronuclear diatomic molecules Hydrogen Bonding and its application Metallic Bonding (Band theory) and application to conductors, semiconductors and insulators Nanoscale Materials - Properties and applications Basic Principles of spectroscopy and its applications for molecular structure	<b>8</b>



<b>Unit - II</b>	<p><b>WATER TECHNOLOGY</b></p> <p>Hardness of water: Causes, Types, Measurement, Boiler troubles: Sludges, Scales and Caustic Embrittlement Softening of water by L-S Process, Zeolite Process and Reverse Osmosis Process, Ion Exchange Process, Calgon Process Numerical Problems based on L-S Process, Zeolite Process and hardness of water. Introduction to the membrane concept for the treatment of microplastics from water</p>	<p><b>8</b></p>
<b>Unit -III</b>	<p><b>POLYMERS</b></p> <p><b>Polymers:</b> Definition, degree of polymerization, functionality of monomer, Classification of polymers with examples, Types of polymerizations – addition and condensation polymerization with examples. Mechanism of addition polymerization.</p> <p><b>Plastics:</b> Definition and characteristics- thermoplastic and thermosetting plastics, preparation, properties, and applications of PVC and Bakelite</p> <p><b>Fibers:</b> Characteristics of fibers – preparation, properties and applications of Nylon and Dacron.</p> <p><b>Conducting polymers:</b> Characteristics and Classification of conducting polymers with examples.</p> <p><b>Biodegradable polymers:</b> Concept and advantages – Preparation of Polylactic acid and poly vinyl alcohol and their applications.</p> <p><b>Liquid Crystalline Polymers:</b> Characteristics, classification with examples and their applications.</p>	<p><b>8</b></p>
<b>Unit –IV</b>	<p><b>FUELS AND RENEWABLE SOURCE OF ENERGY</b></p> <p>Fuels Definition, Classification and Characteristics of a good fuel, Calorific value and its determination by Bomb Calorimeter, Numerical problems on Bomb Calorimeter, Composition and uses of Natural gas, CNG, LPG.</p> <p><b>Renewable Energy Sources:</b> Solar energy, wind energy, hydroelectric and geothermal. Biofuels as alternative sources of energy (biomass, biogas).</p>	<p><b>8</b></p>

<b>Unit-V</b>	<b>ELECTROCHEMISTRY &amp; ITS APPLICATIONS</b>  Electrode potential, standard electrode potential, factors affecting the electrode potential of a cell. Nernst equation: Electrochemical series and its application, Electrochemical cell: Daniel cell, Concentration cells, electrolyte concentration cell Numerical problems based on electrode potential and emf of a cell. Fuel Cells: Introduction, Principles, Classification, and application Corrosion its causes and effects, Theories of corrosion – Chemical & Electrochemical corrosion	<b>10</b>
	<b>Total</b>	<b>42</b>

### 11. Suggested Books:

#### Text Books:

1. [Sunita Rattan](#), “Comprehensive Engineering Chemistry”, S.K. Kataria & Sons Delhi, India, 2<sup>nd</sup> Edition (2009)
2. Shashi Chawala, “Theory and Practical’s of Engineering Chemistry”, Dhanpat Rai and Company, (Pvt) Ltd 3<sup>rd</sup> Edition (2012)
3. Jain & Jain “A text book of Engineering Chemistry,” Dhanpat Rai Publishing Company, 15<sup>th</sup> Edition New Delhi (2008)

#### Reference Books:

1. J.D. Lee, “Concise Inorganic Chemistry”, 5<sup>th</sup> Edition (1996)
2. K. L. Kapoor “A text book of Physical Chemistry” Vol. 5, Macmillan India, 1<sup>st</sup> Edition (2004)
3. Prof. K.N. Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah, “Chemistry for Engineers” McGraw Hill Higher Education Hyd., (2009)
4. William Kemp, “Organic Spectroscopy”, Palgrave Foundations, (1991).
5. L.E.Foster, “Nanotechnology, Science Innovation & Opportunity”, Pearson Education, 2007.
6. Y.R. Sharma “Elementary Organic Spectroscopy: Principles and Chemical Applications”, 1st Edition,
7. F.W.Bill, Meyer, A Text book of Polymer Chemistry, 3<sup>rd</sup> Edition 2009,
8. Thirumala Chary and Laxminarayana, “Engineering Chemistry”, Scitech Publishers, Chennai (2016).

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

Name of Department: **Chemistry**

1. Subject Code: **PCH151/251** Course Title: **Chemistry Practical**
2. Contact Hours: L: **0** T: **0** P: **2**
3. Examination Duration (Hrs): Theory **3** Practical
4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**
5. Credits: **2**
6. Semester: **Autumn/Sprin**
7. Subject Area: **Core Course**
8. Pre-requisite: **Basic Knowledge of Experiments in Chemistry**

<b>9. Course Outcomes:</b>	<ul style="list-style-type: none"> <li>Analyze the water and oil quality parameter.</li> <li>Understand the concept of viscosity, surface tension and their applications.</li> <li>Analyze the ores and bleaching powder sample</li> <li>Knowledge of pH metric and calorimetry and their application in industry.</li> </ul>
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10. Detailed Syllabus: Students must perform any twelve experiments:

UNIT	CONTENTS	CONTACT HRS
EXP- 1	To determine the alkalinity of the given water sample containing carbonate ( $\text{CO}_3^{2-}$ ) ions and bicarbonate ( $\text{HCO}_3^-$ ) ions by titrating it against standard HCl solution [N/10] using phenolphthalein and methyl orange as indicators.	2
EXP - 2	To determine the chloride ion ( $\text{Cl}^-$ ) content in the given water sample by Argentometric method (Mohr's method) using N/50 $\text{AgNO}_3$ as a standard solution and potassium chromate ( $\text{K}_2\text{CrO}_4$ ) as an internal indicator.	2

EXP-3	To determine the temporary and permanent hardness of given water sample by titrating it against standard solution of M/100 Ethylene Diamine Tetracetic Acid (EDTA) using Eriochrome black-T (EBT) as an internal indicator.	2
EXP-4	To determine the coefficient of viscosity of the given sample solution by Ostwald's viscometer (Viscosity of water = 0.0101 Poise).	2
EXP-5	To determine the ferrous ion ( $\text{Fe}^{++}$ ) content in given sample solution of Mohr's salt ( $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ ) by titrating it against standard N/30 potassium dichromate ( $\text{K}_2\text{Cr}_2\text{O}_7$ ) solution by using potassium ferricyanide $\text{K}_3[\text{Fe}(\text{CN})_6]$ as an external indicator.	2
EXP - 6	To determine the surface tension of the given sample solution by drop number method	2
EXP - 7	To determine the acid value of oil	2
EXP - 8	To determine the strength of unknown HCl solution by titrating it against N/10 NaOH solution with the help of pH meter.	2
EXP - 9	Synthesis of phenol-formaldehyde resin	2
EXP – 10	To determine the alkalinity of the given water sample containing carbonate ( $\text{CO}_3^{2-}$ ) ions and hydroxide ( $\text{OH}^-$ ) ions by titrating it against standard HCl solution [N/10] using phenolphthalein and methyl orange as indicators.	2
EXP – 11	To determine the rate constant of a reaction	2
EXP – 12	To determine the Copper ( $\text{Cu}^{++}$ ) ion content in the given sample of copper ore (blue vitriol) by titrating it against standard N/30 sodium thiosulphate solution using starch as indicator by Iodometric titration.	2
EXP - 13	Determination of adsorption isotherm of acetic acid on activated charcoal	2

**Text Books:**

- [Sunita Rattan](#), “ Comprehensive Engineering Chemistry”, S.K. Kataria& Sons Delhi, India, 2<sup>nd</sup> Edition (2009)
- Shashi Chawala , “Theory and Practicals of Engineering Chemistry”, Dhanpat Rai and Company, India 3<sup>rd</sup> Edition (2012)

**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN**  
**CURRICULAR STRUCTURE AND SCHEME**  
**FOR**  
**B.TECH (ELECTRONICS AND COMMUNICATION ENGINEERING)**  
**(BATCH 2021 ONWARDS)**  
**SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECT			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
TEC 101/201	Basic Electronics Engineering	ESC	3	3	0	0	25	25	50	100
<b>LABORATORY AND OTHERS</b>										
PEC 151/251	Basic Electronics Engineering Lab	ESC	1	0	0	2	25	25	50	100
	<b>TOTAL</b>		<b>4</b>	<b>3</b>	<b>0</b>	<b>2</b>				<b>200</b>

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I and II

Name of Department: - **Electronics and Communication Engineering**

1. Subject Code: **TEC101/201** Course Title: **Basic Electronics Engineering**
2. Contact Hours: L: **3** T: **0** P: **0**
3. Examination Duration (Hrs): Theory **3** Practical **0**
4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**
5. Credits: **3**
6. Semester: **First/Second**
7. Subject Area: **Engineering Science Course (ESC)**
8. Pre-requisite: **Basic Semiconductor Physics.**

<b>9. Course Outcome:</b>	<b>Upon completion of this course, the students will be able to</b> <ul style="list-style-type: none"> <li>• <b>Remember</b> operations on number systems and understand concepts of digital circuits.</li> <li>• <b>Understand</b> the basics of semiconductors and PN junction diode.</li> <li>• <b>Apply</b> the basics of PN junction diode in rectifier circuits and DC power supply.</li> <li>• <b>Analyze</b> Bipolar Junction Transistor (BJT) from its basic concepts and biasing circuits.</li> <li>• <b>Evaluate</b> the performance of operational amplifier (OP-amp) from its performance parameters like gain, CMRR, offset values etc.</li> <li>• <b>Design</b> and <b>develop</b> various basic electronic circuits.</li> </ul>
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### 10. Details of the Course:

Unit No.	Contents	Contact Hours
1	<b>Number Systems &amp; Boolean Algebra:</b>  Number systems and their conversion, Addition & subtraction of binary, Octal and hexadecimal numbers, Multiplication & division of binary numbers, fractional numbers, Logic gates, Boolean algebra,	10

	Implementation of basic gates using universal gates, Implementation of logic functions using basic gates & universal gates, SOP & POS form of logic expression, Canonical form, Conversion from SOP & POS form to canonical form, Simplification of Boolean function: Algebraic method, Karnaugh map method (two, three & four variable K-map with don't care condition).	
2	<b>Basics of Semiconductor Devices and its Applications:</b>  Energy band theory: Classification of solids based on energy band diagram, Semiconductors; Intrinsic semiconductors, Extrinsic semiconductors– P-type and N-type, Electrons and holes in intrinsic and extrinsic semiconductors, Mobility and conductivity, Mass action law, Charge densities in semiconductors, Drift and diffusion current, P-N Junction; Formation of depletion region, V- I characteristics of P-N junction diodes, Diode breakdown mechanism.	8
3	<b>AC to DC Conversion and Voltage Regulation:</b>  Introduction to DC power supply, Rectifiers circuit: Half wave, Center tapped full wave and Bridge rectifier circuits. Rectifier performance parameter analysis, Filter circuits: L, C, and Pi filters, Zener diode, Zener breakdown, Zener diode as a voltage regulator, Analysis and design of regulator circuits using Zener diode, Avalanche diode.	8
4	<b>Transistor and its Biasing Circuits:</b>  Construction of bipolar junction transistors (BJT), NPN and PNP type, Characteristics; Common base, Common emitter, Common collector configuration, Transistor biasing; The operating point, Stability factor, Bias stabilization; Fixed bias, Collector to base bias and Self-bias circuit.	8
5	<b>Introduction to Operational Amplifiers:</b>  Introduction to integrated circuits; Advantages and limitations, Characteristics of an ideal Op-amp, Introduction of 741 IC. Inverting and non-Inverting Op-amp circuits, Summing amplifier, Difference amplifier, Voltage follower. Op-amp as integrator and differentiator.	6
	Total	<b>40</b>

#### 11. Suggested Books:

<b>Textbooks</b>	
1.	Jacob Millmann & Halkias, " <b>Integrated Electronics</b> ", TMH, 2 <sup>nd</sup> Edition, 2009.
2.	M. Morris Mano, Michael D. Ciletti, " <b>Digital Design</b> ", Pearson Education, 5 <sup>th</sup> Edition, 2012.
<b>Reference Books</b>	



3.	Boylestad and L. Robert and Nashelsky Louis, " <b><i>Electronics Devices and Circuits Theory</i></b> ", Pearson Education, 10 <sup>th</sup> Edition, 2009.
4.	S. Salivahanan and S. Arivazhagan, " <b><i>Digital Circuits and Design</i></b> ", Oxford University Press, 5 <sup>th</sup> edition, 2018.

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam
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# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

Name of Department: **Electronics and Communication Engineering**

1. Subject Code: **PEC 151/251** Course Title: **Basic Electronics Engineering Lab**
2. Contact Hours: L: **0** T: **0** P: **2**
3. Examination Duration (Hrs): Theory **0** Practical **3**
4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**
5. Credits: **1**
6. Semester: **First/Second**
7. Subject Area: **Engineering Science Course (ESC)**
8. Pre-requisite: **Basic Semiconductor Physics.**

<b>9. Course Outcomes:</b>	<p><b>Upon completion of this course, the students will be able to</b></p> <ul style="list-style-type: none"> <li>• <b>Identify</b> and <b>understand</b> active &amp; passive components along with various measuring instruments.</li> <li>• <b>Verify</b> truth table of logic gates.</li> <li>• <b>Analyse</b> the characteristics of diodes and transistors.</li> <li>• <b>Implement</b> different electronics circuits using operational amplifier and logic gates.</li> </ul>
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## 10. Details of the Course:

Exp. No.	Contents
1.	Familiarization of electronics measuring instrument and components.
2.	Measure the voltage and frequency using a CRO.
3.	Study and verification of the truth table for logic gates.
4.	To design and verify the truth table for logic gates using NOR gate.
5.	To design and verify the truth table for logic gates using NAND gate.
6.	Study V-I characteristics of PN junction diode and determine the static and dynamic resistance from the characteristic curve.
7.	Study of a Half wave rectifier circuit with and without capacitor filter.

<b>8.</b>	Study of a Full wave rectifier circuit with and without capacitor filter.
<b>9.</b>	Study V-I characteristics of Zener diode and determine its voltage regulation.
<b>10.</b>	Study the input and output characteristics of common base (CB) transistor.
<b>11.</b>	Study the input and output characteristics of common emitter (CE) transistor.
<b>12.</b>	Design and verification of Inverting and non-inverting amplifier using Op-Amp IC.
<b><i>Innovative Experiments</i></b>	
<b>13.</b>	Design and verification of summer and subtractor circuit using Op-Amp IC
<b>14.</b>	Study and verification of the truth table for half adder using logic gates.
<b>15.</b>	As suggested by the concerned faculty/lab in charge.
<b>Mode of Evaluation</b>	Viva / Mid Term Lab Exam / End Term Lab Exam

**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN**  
**CURRICULAR STRUCTURE AND SCHEME**  
**FOR**  
**B. TECH (ELECTRICAL ENGINEERING)**  
**SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
TEE 101/201	Basic Electrical Engineering	Core	4	3	1	0	25	25	50	100
LABORATORY AND OTHERS										
PEE 151/251	Basic Electrical Engineering Lab	Core	1	0	0	2	25	25	50	100
TOTAL			5	3	1	2	50	50	100	200

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I and II

Name of Department: - **Electrical Engineering**

1. Subject Code: **TEE101/201** Course Title: **Basic Electrical Engineering**

2. Contact Hours: L: **3** T: **1** P: **0**

3. Examination Duration (Hrs): Theory **3** Practical **0**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **4**

6. Semester: **Autumn/Spring**

7. Subject Area: **Core Course**

8. Pre-requisite: Basic Knowledge of Mathematics and Physics

9. <b>Course Outcome:</b>	<ul style="list-style-type: none"><li>• <b>Recall</b> the concept of voltage, current, resistance and laws related to electricity with reference to the electrical circuits/systems.</li><li>• <b>Demonstrate</b> the basic fundamentals of electrical circuits/systems/components.</li><li>• <b>Summarize</b> the basic characteristics of electrical systems/components.</li><li>• <b>Illustrate</b> the operation of various electrical machines.</li><li>• <b>Solve</b> the electrical circuits numerically</li><li>• <b>Distinguish</b> between various types of electrical systems/components.</li></ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>DC Circuits:</b> Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Mesh and Node analysis with DC source. Superposition, Thevenin's and Norton Theorems, Maximum Power Transfer theorem	9
2	<b>AC Circuits:</b> Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.	8

	Three-phase balanced circuits, voltage and current relations in star and delta connections	
3	<b>Transformers:</b> Magnetic circuit, BH characteristics, ideal and practical transformer, equivalent circuit, losses and efficiency of transformers, auto-transformer.	8
4	<b>Electrical Machines:</b> Working principle and e.m.f equation of dc machine, torque speed characteristic of separately excited dc motor, working principle of three phase induction motor.	8
5	<b>Electrical Installations:</b> Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, RCD, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement.	9
	Total	<b>42</b>

#### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
	<b>Text Books</b>	
1.	D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,	2010.
2.	D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill	2009
3.	V. N Mittle and Arvind Mittle, "Basic Electrical Engineering" Tata McGraw-Hill Education Pvt. Ltd	2005
	<b>Reference Books</b>	
1.	E. Hughes, "Electrical and Electronics Technology", Pearson.	2010
2.	L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press,	2011
3.	V.D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India,	1989
12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

Name of Department: **Electrical Engineering**

1. Subject Code: **PEE 151/251** Course Title: **Basic Electrical Engineering Lab**

2. Contact Hours: L: **0** T: **0** P: **2**

3. Examination Duration (Hrs): Theory **0** Practical **3**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **1**

6. Semester: **Autumn/Sprin**

7. Subject Area: **Core Course**

8. Pre-requisite: **Physics.**

9. <b>Course Outcomes:</b>	<ul style="list-style-type: none"> <li>• <b>Illustrate</b> and Verification of various laws and theorems of DC circuit</li> <li>• <b>Determine</b> different parameters involved in Electrical measurement</li> <li>• <b>Evaluate</b> Transformer losses.</li> <li>• <b>Create</b> resonance condition in R-L-C series and parallel circuit and learn its characteristics.</li> </ul>
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## 10. Details of the Course:

Sl. No.	Contents
1.	To verify Kirchhoff's voltage law (KVL) in D.C. circuits
2.	To verify Kirchhoff's current law (KCL) in D.C. circuits
3.	To verify superposition theorem for DC circuits.
4.	To verify Thevenin's theorem for DC circuits
5.	To verify Norton's theorem for DC circuits.
6.	To verify maximum power transfer theorem in DC circuits.
7.	To find out the meter constant of a single-phase energy meter.
8.	To measure the power and power factor of a three-phase balanced circuit by two wattmeter methods
9.	To perform Open Circuit Test on single phase transformer to find out core loss
10.	To perform Short Circuit Test on single phase transformer to find out copper loss
11.	To Study the reversing of direction of rotation of 3-phase induction motor by phase reversal method.
12.	To draw the current versus frequency characteristics in RLC series circuit
13.	To draw the current versus frequency characteristics in parallel RLC circuit
11.	<b>Mode of Evaluation</b> Viva / Mid Term Lab Exam / End Term Lab Exam

**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN**

**CURRICULAR STRUCTURE AND SCHEME**

**FOR**

**B. TECH (ENGINEERING PHYSICS)**

**(BATCH 2019 & ONWARDS)**

**SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
TPH 101/201	Engineering Physics	-	3	3	0	0	25	25	50	100
LABORATORY AND OTHERS										
PPH 151/251	Physics Lab		1	0	0	2	25	25	50	100
	TOTAL		4	3	0	2				200



# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I and II

Name of Department: - **Allied Sciences (Physics)**

1. Subject Code: **TPH101/201** Course Title: **Engineering Physics**
2. Contact Hours: L: **3** T: **0** P: **0**
3. Examination Duration (Hrs): Theory **3** Practical **0**
4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**
5. Credits: **3**
6. Semester: **I / II**
7. Subject Area: **BSC**
8. Pre-requisite: Basic Knowledge of Physics

<b>9. Course Outcome:</b>	<ul style="list-style-type: none"><li>• Define the wave nature of light through different phenomenon.</li><li>• Extend the knowledge of Laser, fiber optics and polarization in engineering problems.</li><li>• Understand the concept of theory of relativity.</li><li>• Examine the behavior of Electromagnetic Waves (EM) using Maxwell Equations.</li><li>• Explain the properties of Superconductors.</li><li>• Discuss quantum theory of radiation and applications of Schrodinger wave equations.</li></ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>Interference:</b> Conditions of interference, Spatial and temporal coherence, Bi-prism experiment, interference in wedge shaped film, Newton's rings. <b>Diffraction:</b> Fraunhofer diffraction at single slit and n-slits (Diffraction Grating). Rayleigh's criteria of resolution. Resolving power of grating.	9
2	<b>Polarization:</b> Basic theory of double refraction, Malus law, Ordinary and Extra-ordinary ray, Production, and detection of plane, circularly and	9

	<p>elliptically polarized light, specific rotation and polarimeters.</p> <p><b>Laser:</b> Spontaneous and Stimulated emission of radiation, Einstein Coefficients' Principle of laser action. Construction and working of Ruby and He-Ne laser photovoltaic effect.</p> <p><b>Fiber Optics:</b> Introduction to Fiber Optics, types of fiber, acceptance angle and cone, numerical aperture</p>	
3	<p><b>Special theory of relativity:</b> Inertial and non-inertial frames, Galilean transformation, Michelson-Morley experiment, Einstein postulates of special theory of relativity, Lorentz transformation equation, length contraction, time dilation, variation mass of velocity, Mass energy relation.</p>	8
4	<p><b>Superconductivity:</b> Essential properties of Superconductors, zero resistivity, Type I, Type II superconductors and their properties.</p> <p><b>Electromagnetism:</b> Displacement current, Three electric vectors (<b>E</b>, <b>P</b>, <b>D</b>), Maxwell's equations in integral and differential forms. Electromagnetic wave propagation in free space.</p>	8
5	<p><b>Quantum Mechanics:</b> Quantum concept and radiation, Wave particle duality (de-Broglie concept of matter waves), Heisenberg's uncertainty principle, Schrodinger's wave equation in one dimension under a conservative force field, wave function and its significance, Eigen values and Eigen functions for particle confined in one dimensional infinite potential box (rigid box).</p>	8
	Total	42

### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	Year of Publication /Reprint
	<b>Text Books</b>	
1.	AjoyGhatak, "Optics", 4 <sup>th</sup> Edition, Tata Mc Graw Hill, 2009	2009
2.	N. Subrahmanyam Brijlal& M. N. Avadhanulu, "Optics", 24 <sup>th</sup> Edition, S. Chand, 2010	2010
3.	A. Beiser, "Concepts of Modern Physics", Tatac Mc Graw Hill, 6 <sup>th</sup> edition	<b>2009</b>
4.	Resnick, Krane, Halliday, "Physics (vol I&II)", 5 <sup>th</sup> Edition, Wiley, 2007	2007
5.	Robert Resnick, "Introduction to Special Relativity", Wiley Publishers, 2007	2007

	<b>Reference Books:</b>	
	John R. Taylor, Chris D. Zafiratos, Michael A. Dubson, “Modern Physics”, 1 <sup>st</sup> Edition, Pearson Education, 2007	2007
	Gerd Keiser, “Optic Fiber Communication” 5 <sup>th</sup> Edition, Tata Mc. Graw Hill, 2017	2017
	Alastair I M Rae, Jim Napolitano, “Quantum Mechanics” 6 <sup>th</sup> Edition, Wiley, 2015	2015
	David J. Griffiths, “Introduction to Electrodynamics”, 3 <sup>rd</sup> Edition, Prentice, 2011	2011
	Charles P. Poole, Jr. Frank J. Owens, “Introduction to Nanotechnology”, Wiley, 2017	2017
	Hug D. Young & Roger A. Freedman, “University Physics”, 12 <sup>th</sup> Edition, Pearson Publication, 2008	2008
	Alan Giambattista, Betty Mc. Carthy Richardson, Robert C Richardson, “Fundamentals of Physics”, 1 <sup>st</sup> Edition, Tata Mc Graw Hill, 2009	2009

12.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam
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# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

Name of Department: **Allied Sciences (Physics)**

1. Subject Code: **PPH 151/251** Course Title: **Physics Lab**
2. Contact Hours: L: **0** T: **0** P: **2**
3. Examination Duration (Hrs): Theory **0** Practical **2**
4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**
5. Credits: **1**
6. Semester: **I / II**
7. Subject Area: **BSC**
8. Pre-requisite: Basic Knowledge of Experiments in Physics

<b>9. Course Outcomes:</b>	<ul style="list-style-type: none"><li>• Find the electrical and magnetic properties of materials and extend the knowledge of nanotechnology using electroplating.</li><li>• Understand the principle and characteristics of photo devices and optical fiber.</li><li>• Apply the methods of calibration to analog instruments.</li><li>• Determine the wavelength of light and specific rotation of optically active substance through the experiments based on phenomena of optics.</li></ul>
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## 10. Details of the Course:

Sl. No.	Contents
1.	To determine the wavelength of monochromatic light by Newton's ring experiment.
2.	To determine refractive index of transparent liquid by Newton's ring experiment.
3.	To determine the specific resistance of the constantan wire using Carey- Foster's bridge.
4.	To determine the wavelength of monochromatic light using Fresnel Biprism experiment
5.	To determine the energy band gap of given semiconductor by Four-probe method.
6.	(a) To determine the wavelengths of spectral line of Mercury light using plane transmission grating. (b) To determine the wavelengths of given Laser light using plane transmission grating.
7.	To study the variation of magnetic field with distance along the axis of circular coil

	carrying current and to determine the radius of coil.
8.	To determine the magnetic susceptibility of a paramagnetic substance by Quincke's method.
9.	To determine the specific rotation of Sugar Solution using Half Shade Polarimeter.
10.	To study the characteristics of Solar Cell
11.	a) To calibrate Voltmeter by using potentiometer. b) To calibrate Ammeter by using potentiometer.
12.	To determine Planck's constant by photoelectric method and study the variation of intensity with distance.
13.	To determine the electro chemical equivalent of Copper.
14.	To Verify Law of Malus.
15.	To study Hall Effect and determine the hall voltage, hall coefficient, current density and carrier mobility of a given semiconductor.
16.	To determine the numerical aperture and acceptance angle of an optical fiber.
	<b>Mode of Evaluation</b> Viva / Mid Term Lab Exam / End Term Lab Exam

**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN**  
**CURRICULAR STRUCTURE AND SCHEME**  
**FOR**  
**B.TECH (Biotechnology)**  
**(BATCH 2019 & ONWARDS)**  
**SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
THF 101/201	Healthy living & Fitness	Institutional Initiative	1	1	0	0	50	0	50	100

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I and II

Name of Department: - **Biotechnology**

1. Subject Code: **THF101/201** Course Title: **Healthy Living & Fitness**

2. Contact Hours: L: **1** T: **0** P: **0**

3. Examination Duration (Hrs): Theory **1.5 hr** Practical **0**

4. Relative Weight: CWA **50** PRS **0** MSE **0** ESE **50** PRE **0**

5. Credits: **1**

6. Semester: **Autumn/Spring**

7. Subject Area: **Institutional Initiative**

8. Pre-requisite: **Basic semiconductor Physics.**

9. <b>Course Outcome:</b>	<ul style="list-style-type: none"><li>• The benefits of healthy life style</li><li>• Importance of balanced food and proper diet in daily</li><li>• Problems related to addiction and benefits of yoga</li><li>• Basic first aid procedures.</li></ul>
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>Human Body</b>  Awareness of important body organs, their location and broad functions.  <b>Diet and Health</b>  Importance of breakfast, fruits, whole grains  Knowledge about constituents of diet, proteins, fats, carbohydrate, vitamins and minerals.  Importance of fiber.	2
2	<b>Life style Diseases</b>	3

	<p>Harmful effects of junk/ processed foods.</p> <p>Dangers of obesity</p> <p>Diseases ensuing because of lifestyle eg. Diabetes, heart diseases etc.</p>	
3	<p><b>Exercise</b></p> <p>Benefits of exercise and yoga.</p> <p><b>Addictions</b></p> <p>Chewing/ unhealthy harmful products</p> <p>Drinking</p> <p>Smoking</p>	3
4	<p><b>Importance of Mental Health</b></p> <p>Stress management</p> <p>Anxiety and depression</p> <p>Awareness of commonly encountered diseases/ailments</p>	3
5	<p><b>First Aid</b></p> <p>First aid in commonly encountered emergency</p>	1
	Total	12

10.	<b>Mode of Evaluation</b>	Test / Quiz / Assignment / End Term Exam
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**GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN**  
**CURRICULAR STRUCTURE AND SCHEME**  
**FOR**  
**B.TECH (MECHANICAL ENGINEERING)**  
**(BATCH 2021 & ONWARDS)**  
**SEMESTER I & II**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
LABORATORY AND OTHERS										
PME 151/251	Workshop and Manufacturing Practices	Core	3	1	0	4	25	25	50	100
	<b>TOTAL</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>				<b>100</b>

# GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

## SEMESTER I and II

Name of Department: - **Mechanical Engineering**

1. Subject Code: **PME 151/251** Course Title: **Workshop and Manufacturing**

2. Contact Hours: L: **1** T: **0** P: **4**

3. Examination Duration (Hrs): Theory **3** Practical **3**

4. Relative Weight: CWA **25** PRS **0** MSE **25** ESE **50** PRE **0**

5. Credits: **3**

6. Semester: **Autumn/Spring**

7. Subject Area: **ESC**

8. Pre-requisite: **Nil**

<b>9. Course Outcome:</b>	CO1: To identify various conventional, non-conventional and automated manufacturing techniques. CO2: To explain various manufacturing practices used for the production of work-pieces in different shops like carpentry, welding, sheet metal etc. CO3: To apply the principles of manufacturing in fabrication of jobs. CO4: To analyse the properties of different materials used for fabrication of jobs. CO5: To generate the designs for fabrication of jobs.
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### 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	<b>Introduction to Manufacturing:</b> Introduction to manufacturing, 3M's of manufacturing – man, machine and material, Types of manufacturing processes, Manufacturing shops-machine shop, fitting shop, carpentry shop, welding shop, sheet metal shop, black smithy shop, foundry shop, Introduction to advance manufacturing, Safety and precaution in workshop.	5

2	<b>Machine Shop:</b> Introduction to machining process, Measuring & marking tools used in machine shop, Parts of lathe and drilling machine, Working principle of lathe and drilling, Tools used in lathe, Materials. <ol style="list-style-type: none"> <li>1. To make a work piece using facing and turning operation.</li> <li>2. To make a work piece using step turning and thread making operation.</li> </ol>	10
3	<b>Foundry Shop:</b> Introduction to foundry; Pattern material-wood, cast iron, brass, aluminum, waxes etc., Types of patterns, Types of tools, Moulding sands-green sand, dry sand, loam sand, facing sand etc., Casting-Sand preparation, mould making, melting, pouring, and cleaning. <ol style="list-style-type: none"> <li>3. To prepare a mould for casting using a single piece pattern.</li> <li>4. To prepare a mould for casting using a split pattern.</li> </ol>	10
4	<b>Sheet Metal Shop:</b> Introduction to sheet metal shop, Tools used in sheet metal shop, Types of Operations, Fabrication of daily use item such as funnel, tray, etc. <ol style="list-style-type: none"> <li>5. To make a funnel using sheet metal forming (Material: 24 SWG) of given dimensions.</li> <li>6. To make a square tray using sheet metal forming (Material: 24 SWG) of given dimensions.</li> </ol>	10
5	<b>Fitting Shop:</b> Introduction to fitting, Types of tools used in fitting shop for measuring, marking, cutting, etc., callipers and Vernier calliper, material used in tools. <ol style="list-style-type: none"> <li>7. To make a square piece of mild steel of given dimensions.</li> <li>8. To make a fitting job of given profile and dimensions.</li> </ol>	10
6	<b>Welding Shop:</b> Introduction to welding, Classifications of joining processes, Arc welding processes-power source, electrodes, edge preparation, Different types of joints. Electric arc welding, Metal inert gas welding, Tungsten inert gas welding. <ol style="list-style-type: none"> <li>9. To prepare a butt (Single-V)/ fillet joint through electric arc welding.</li> <li>10. To prepare a butt (Single-V)/ fillet joint through TIG/MIG welding.</li> </ol>	10

7	<b>Carpentry Shop:</b> Introduction to carpentry shop, Wood and its type, Classification of timber, Seasoning and preservation of wood, Description and applications of the various tools used in carpentry, Different joints and their practical uses. 11. To make corner-lap/ centre - lap joint. 12. To make Mortise and Tenon joint.	10
8	<b>Black smithy Shop:</b> Introduction to blacksmithy shop, Tools used in black smithy shop, Types of Operations, Properties of metal- ductility, malleability, strength, etc. 13. To make a square of round mild steel bar. 14. To make a mild steel chisel/ nail.	10
9	<b>Non-conventional and Automated Manufacturing Techniques:</b>  15. Demonstration of Non-conventional fabrication techniques- 3D Printing, Laser Cutting. 16. Demonstration of Automated manufacturing techniques- CNC, MasterCAM Software, Application of Industrial Robot, Assembly Line in Manufacturing Execution System.	5
	<b>Total</b>	<b>80</b>

### 11. Suggested Books:

SL. No.	Name of Authors/Books/Publishers	
	<b>Reference Books</b>	
1.	Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.	
2.	Mehta R.C.S., Narank D., Chaudhary A.K., Introduction to Engineering Workshops, Spire Publications.	
3.	Choudhury S.K.H., Choudhury A.K.H., Roy N., Elements of Workshop Technology Vol. I & II, Media Promoters & Publishers Pvt. Ltd.	
12.	<b>Mode of Evaluation</b>	Viva / Mid Term Lab Exam / End Term Lab Exam