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BACHELOR OF TECHNOLOGY

(BIOTECH BRANCH)

B.Tech (BioTech)
CURRICULUM STRUCTURE AND EVALUATION SCHEME W.E.F 2021-22

SEMESTER: I

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
EEC101	Basic Electrical & Electronics Engineering	FC	4	3	1	-	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
EEC151	Basic Electrical & Electronics Engineering Lab.	FC	1	-	-	2	25	25	50	100
GP101	General Proficiency	GP	1	-	-	-	-	-	100	100
	Total		**22**	**14**	**1**	**12**	**225**	**225**	**550**	**1000**

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
MAB201	Engineering Mathematics	FC	4	3	1	-	25	25	50	100
TCS201	Programming for Problem Solving	FC	3	3	-	-	25	25	50	100
BTE201	Advanced Organic Chemistry	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
PCS251	Computer Lab-II	FC	2	-	-	4	25	25	50	100
GP201	General Proficiency	GP	1	-	-	-	-	-	100	100
	Total		**20**	**15**	**1**	**6**	**225**	**175**	**500**	**900**

GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

CURRICULAR STRUCTURE AND SCHEME
FOR
B.TECH (ELECTRONICS AND COMMUNICATION ENGINEERING)
(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								
TCS 101	Fundamental of computer and introduction to programming	Core	3	3	0	0	25	25	50	100
TCS 201	Programming for Problem Solving	Core	3	3	0	0	25	25	50	100
LABORATORY AND OTHERS										
PCS 151	Computer Lab I	Core	2	0	0	4	25	25	50	100
PCS 251	Computer Lab II	Core	2	0	0	4	25	25	50	100

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. **Course Outcome:**	• Learn the concepts of IT and understand the fundamentals of basic building blocks of computer science. • Understand basic data types and syntax of C programming.. • Propose solution to problem by using tools like algorithm and flowcharts. • Analyze and select best possible solution for decision-based problems using decision making skills. • Develop the aptitude to solve iterative problems using different types of looping statements. • Implement complex problem as a collection of sub problems by applying modularization in applications using functions.

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	**UNIT- I**	8

	Generation of computers, Computer system memory hierarchy, Input/Output, RAM/ROM, Software & Hardware, Understand bit, byte, KB, MB, GB and their relations to each other, Operating System overview, Computer Networks Overview Algorithms and Flow Charts – Examples of Flow charts for loops and conditional statements	
2	**UNIT- 2** First C program - Hello world, How to open a command prompt on Windows or Linux How to read and print on screen - printf(),scanf(),getchar(), putchar() Variables and Data types - Variables, Identifiers, data types and sizes, type conversions, difference between declaration and definition of a variable, Constants Life of a C program (Preprocessing, Compilation, Assembly, Linking, Loading, Execution), Compiling from the command line, Macros, 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),	10
3	**UNIT- III** **Conditional statements:** 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 **Loops:** 'for' loops, 'while' loops, 'do while' loops, entry control and exit control, break and continue, nested loops	8
4	**UNIT- IV** **Arrays:** 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	10
5	**UNIT- V**	7

	Functions: 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, **Storage classes:** 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	
	Total	**43**

11**. Suggested Books:**

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
	Text Books	
1.	• Peter Prinz, Tony Crawford,"C in a Nutshell", 1stEdition, Oreilly Publishers,	2011
2.	• Peter Norton, "Introduction to computers", 6thEdition, TMH,	2009
	Reference Books	
1.	• Steve Oualline, "Practical C programming", 3rdEdition, Orielly Publishers, 2011.	2011
2.	• Brian W Kernighan, Dennis M Ritcie,"The C Programming Language", 2ndEdition, Prentice Hall, 1988. R3. Herbert Schildt," C: The Complete Reference", 4thEdition.TMH, 2000.	2000
3.	• E.Balagurusamy,"Programming in ANSI C",6th Edition, McGraw Hill	2015
4.	• YashwantKanetkar,"Let Us C",8th Edition,BPB Publication	2007

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam

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. **Course Outcome:**	• Learn and apply concepts of strings for providing solutions to homogenous collection of data types • Propose solution to problem by using tools like algorithm and flowcharts. • Apply the concept of pointers to optimize memory management by overcoming the limitations of arrays. • Process and analyze problems based on heterogeneous collection of data using structures. • Apply concepts of file handling to implement data storage and retrieval tasks. • Implement the basic real life problems using python

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	**UNIT- I** 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	**UNIT- 2** 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	**UNIT- III** **File Handling -** 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	**UNIT- IV** **Introduction to Python-** 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	**UNIT- V** 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	**44**

11**. Suggested Books:**

SL. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
	Text Books	
1.	• Peter Prinz, Tony Crawford,"C in a Nutshell", 1stEdition, Oreilly Publishers,	2011
2.	• YashwantKanetkar,"Let Us C",8th Edition,BPB Publication	2007
	Reference Books	
1.	• Steve Oualline, "Practical C programming", 3rdEdition, Orielly Publishers, 2011.	2011
2.	• Brian W Kernighan, Dennis M Ritcie,"The C Programming Language", 2ndEdition, Prentice Hall, 1988. R3. Herbert Schildt," C: The Complete Reference", 4thEdition.TMH, 2000.	2000
3.	• E.Balagurusamy,"Programming in ANSI C",6th Edition, McGraw Hill	2015

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam

GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

CURRICULAR STRUCTURE AND SCHEME
FOR
B. TECH (Biotech)
(BATCH 2019 & ONWARDS)

SEMESTER II

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
MAB 201	Engineering Mathematics	Core	4	3	1	0	25	25	50	100
	TOTAL		**4**	**3**	**1**	**0**				**100**

GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

SEMESTER II

Name of Department: - **Mathematics**

1. Subject Code: **MAB 201** Course Title: **Engineering Mathematics**
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.**

9. **Course Outcome:**	• Understand the concept of Matrices and determinants. • Identify and understand the significance of Differentiation and Integration in Biotechnology. • Solve the linear differential equations. • Illustrate linear and nonlinear algebraic equations. • Explain the applications of probability and Statistics in Biotechnology. • Use of Mathematics and their applications in Biotechnology.

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	**MATRICES** Definitions, type of matrices, properties of matrices, algebra of matrices (Addition, subtractions and multiplication), Determinants, Properties of determinants, Adjoint of matrix, Inverse of a matrix, System of linear equations, Eigen values and Eigen vectors for order 2..	10
2	Limit (L' Hospital Rule) and Continuity, Differentiation of Standard functions, Basic Rule of Differentiation (product rule, quotient rule, chain rule), Maxima and minima for one variable, Integration	10

	(Integration by part, Integration by Substitution).	
3	Differential equations, Differential equations of first order and first degree. Variable separable method, Homogeneous differential equations, linear differential equations, Linear differential equations of second order with constant coefficients, complimentary function, and particular integral	8
4	Numerical solution of linear and nonlinear algebraic equations (using Bisection method, Iterative method, Newton Raphson method), Numerical Integration (trapezoidal and Simpson's rule)	7
5	Mean, median, mode and standard deviation, Random variables, Binomial, Poisson and normal distributions, Correlation, and regression analysis.	10
	Total	**45**

11**. Suggested Books:**

SL. No.	**Name of Authors/Books/Publishers**	**Year of Publication/ Reprint**
	Text Books	
1.	C. B. Gupta, S. R. Singh and Mukesh Kumar, "Engineering Mathematics for Semesters I and II" McGraw Hill Education, First edition.	2015
2.	Agarwal. Remedial Mathematics, Shree Sai Prakashan Meerut.	2006
3.	Vashitha. Remedial Mathematics, Krishna Publications, Meerut	2007
	Reference Books	
1.	Piskunov N: Differential & Integral calculus, Moscow Peace Puse.	1982
2.	B. S. Grewal, Higher Engineering Mathematics, Khanna Publications	2009

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term 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

9. **Course Outcome:**	• Define the wave nature of light through different phenomenon. • Extend the knowledge of Laser, fiber optics and polarization in engineering problems. • Understand the concept of theory of relativity. • Examine the behavior of Electromagnetic Waves (EM) using Maxwell Equations. • Explain the properties of Superconductors. • Discuss quantum theory of radiation and applications of Schrodinger wave equations.

10. **Details of the Course:**

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

	elliptically polarized light, specific rotation and polarimeters. **Laser:** Spontaneous and Stimulated emission of radiation, Einstein Coefficients' Principle of laser action. Construction and working of Ruby and He-Ne laser photovoltaic effect. **Fiber Optics:** Introduction to Fiber Optics, types of fiber, acceptance angle and cone, numerical aperture	
3	**Special theory of relativity:** 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.	**8**
4	**Superconductivity:** Essential properties of Superconductors, zero resistivity, Type I, Type II superconductors and their properties. **Electromagnetism:** Displacement current, Three electric vectors (**E**, **P**, **D**), Maxwell's equations in integral and differential forms. Electromagnetic wave propagation in free space.	**8**
5	**Quantum Mechanics:** 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).	**8**
	Total	**42**

11. Suggested Books:

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

	Reference Books:	
	John R. Taylor, Chris D. Zafiratos, Michael A. Dubson, "Modern Physics", 1st Edotion, Pearson Education, 2007	2007
	Gerd Keiser, "Optic Fiber Communication" 5th Edition, Tata Mc. Graw Hill, 2017	2017
	Alastair I M Rae, Jim Napolitano, "Quantum Mechanics" 6th Edition, Wiley, 2015	2015
	David J. Griffiths, "Introduction to Electrodynamics", 3rd 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", 12th Edition, Pearson Publication, 2008	2008
	Alan Giambattista, Betty Mc. Carthy Richardson, Robert C Richardson, "Fundamentals of Physics", 1st Edition, Tata Mc Graw Hill, 2009	2009

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam

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

9. **Course Outcomes:**	• Find the electrical and magnetic properties of materials and extend the knowledge of nanotechnology using electroplating. • Understand the principle and characteristics of photo devices and optical fiber. • Apply the methods of calibration to analog instruments. • Determine the wavelength of light and specific rotation of optically active substance through the experiments based on phenomena of optics.

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.

	Mode of Evaluation	Viva / Mid Term Lab Exam / End Term Lab Exam

GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

CURRICULAR STRUCTURE AND SCHEME
FOR
B.TECH (Biotech)
(BATCH 2021 & ONWARDS)

SEMESTER II

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS			CREDITS	L	T	P	CWA	MSE	ESE	TOTAL
CODE	TITLE	COMPONENT								
BTE 201	Advanced Organic Chemistry	Core	3	3	0	0	25	25	50	100

Name of Department: **Biotechnology**

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

9. **Course Outcomes:**	• understand the basic knowledge of different techniques of purification of organic compound • explain the reaction mechanism in organic chemistry. • illustrate concepts and knowledge on nanotechnology and its application • Learn and apply the concepts of analytical chemistry for sample analysis • discuss the knowledge of carbohydrates and their practical application to biotechnology and engineering.

10. Details of the Course:

UNIT	CONTENTS	Contact Hrs
Unit - I	**PURIFICATION OF ORGANIC COMPOUNDS** Crystallization sublimation, Distillation, Fractional distillation, distillation under reduced pressure, Steam distillation, Extraction with solvent, chromatography	**4**

Unit - II	**(a) STRUCTURE OF ORGANIC COMPOUNDS** Nature of covalent bond and its orbital representation. Hybridization, bond energy, polarity of bond & dipole moment of molecules, Isomerism **(b) ORGANIC REACTIONS AND THEIR MECHANISM** Bond fission, Inductive effect, hyperconjugation, electromeric, resonance effects and their significance; Types of reagents: electrophiles & nucleophiles, Reaction intermediates: carbocation, carbanion, carbenes, and free radicals- generation, properties and stability, **(c)** Addition reactions, Substitution reactions, Elimination reactions in organic chemistry. Orientation in aromatic substitution reactions	**5** **7** **7**
Unit - III	**(a) NANOMATERIALS** Introduction, Green nanotechnology, Synthesis of nanoparticles and its applications **(b) GREEN CHEMISTRY** Introduction, Twelve Principles of Green Chemistry, Adverse effects of chemicals, Practice of Green Chemistry	**3** **3**
Unit - IV	**Analytical Chemistry: Basics and its applications** a. Definition of Qualitative and quantitative analysis, volumetric and gravimetric analysis. b. Principle of volumetric analysis. Concept of pH, buffer solution and Henderson equation. Concept of strength and concentration of solution, Normality, Molarity, Molality and interconversion of strength, c. Types of volumetric analysis**:** Acid-base, Complexometric, redox and precipitation titration (Principle and examples). d. Principle and applications of the following methods: **Chromatography:** Introduction, principle & application of chromatography. Paper chromatography, thin layer	**8**

	chromatography, column chromatography: silica and gel filtration. **Thermoanalytical methods:** Thermogravimetric Analysis, Thermometric Titrations **Electroanalytical techniques:** Electrogravimetry, Polarography and Voltametric Methods. **Atomic Spectroscopy**: Principle and application of atomic absorption spectroscopy and flame photometry.	
Unit - V	**CARBOHYDRATES** Definition, Classification, General Properties. Preparation of Glucose, its physical and chemical properties, Killiani Fischer synthesis, Ruff degradation	**5**
	Total	**42**

Textbooks:

1. Morrison & Boyd "Organic Chemistry",6th edition ,Pearson education
2. I.L.Finar, Organic Chemistry (Vol. I & II) 5th Edition 2009, Pearson Publication
3. Bahl and Bahl, "Advanced Organic Chemistry"by S. Chand& Company Ltd.

Reference Books:

1. F.W.Bill Meyer, "Text book of Polymer Chemistry, 3rd Edition 2009, W.J.Wiley India
2. Advanced Organic Chemistry by Bernard Mille
3. Organic Structural Spectroscopy by Joseph Lambert, Scott Gronert, Herbert Shurvell, David Lightner and Robert Graham Cooks
4. L.E.Foster, "Nanotechnology, Science Innovation & Opportunity", Pearson Education, 2007.

GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

CURRICULAR STRUCTURE AND SCHEME
FOR
B. TECH (BioTech Group)

SEMESTER I

COURSE MODULE			CREDITS	TEACHING PERIODS			WEIGHTAGE: EVALUATION			
THEORY SUBJECTS										
CODE	**TITLE**	**COMPONENT**		**L**	**T**	**P**	**CWA**	**MSE**	**ESE**	**TOTAL**
EEC 101	Basic Electrical and Electronics Engineering	Core	3	3	0	0	25	25	50	100
LABORATORY AND OTHERS										
EEC 151	Electrical and Electronics Engineering Lab	Core	1	0	0	2	25	25	50	100
	TOTAL		**4**	**3**	**0**	**2**	**50**	**50**	**100**	**200**

GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

SEMESTER I (BioTech Group)

Name of Department: - **Electrical Engineering**

1. Subject Code: **EEC 101** Course Title: **Basic Electrical and 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: **Autumn**
7. Subject Area: **Core Course**
8. Pre-requisite: Basic Knowledge of Mathematics and Physics

9. **Course Outcome:**	• **Recalling** the concepts of basic electric circuits and remembering the theorems to solve DC Circuits. • **Summarize** the various characteristics of AC Circuits. • **Applying** the concepts of magnetic circuits to understand the basic characteristics of single-phase Transformer. • **Analyzing** the basics of semiconductor devices used for electronic components. • **Evaluating** the basic concept of PN junction diode and its applications in rectifier circuits and DC power supply. • **Compiling** Bipolar Junction Transistor (BJT) from its basic concepts and various biasing circuits.

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
Unit -1	**D.C. Network Theory:** Circuit theory concepts-KCL, KVL, mesh and node analysis, Network Theorems- Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Star Delta transformation.	07
Unit -2	**A.C. Circuit Analysis:** Sinusoidal and phasor representation of voltage and current, single phase a.c. circuit behavior of resistance, inductance and capacitance and their combination in series & parallel, power factor, series parallel resonance and quality factor.	07
Unit -3	**Magnetic Circuits:**	06

	Introduction, series-parallel magnetic circuits comparison, Eddy currents and Hysteresis losses. **Single Phase Transformer:** Principle of operation, classification, phasor diagram at no load, efficiency and all-day efficiency of transformer.	
Unit -4	**Semiconductor Basics:** Insulators, semiconductors and metals, Mobility and conductivity, Intrinsic and extrinsic semiconductors and charge densities in semiconductors, Fermi Level, current components in semiconductors, continuity equation. **Junction Diode and Its Applications:** PN Junction diode – characteristic and analysis, Diode Models, Rectifiers and filter circuit: Half wave, full wave and Bridge rectifier circuits and their analysis, L, C and Pi filters, Zener Diode, Basic regulator supply using Zener diode, Design of Regulator circuits. .	10
Unit – 5	**TRANSISTORS:** Construction and characteristics of bipolar junction, transistors (BJT's)- Comm. Base, Comm. emitter, Comm. Collector configuration, Transistor biasing and bias stabilization: - the operating point, stability factor, analysis of fixed base bias, collector to base bias, Emitter resistance bias circuit and self-bias circuit.	8
	Total Hours	38

11. Suggested Books:

Sl. No.	Name of Authors/Books/Publishers	Year of Publication / Reprint
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
4	Jacob Millmann & Halkias, "**Integrated Electronics**", 2nd Edition, TMH,	2010
5	Boylestad and L. Robert and Nashelsky Louis, "**Electronics Devices and Circuits Theory**", 9th Edition.,PHI/Pearson Education.	2010

12.	**Mode of Evaluation**	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: **EEC 151** Course Title: **Electrical and 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: **Autumn**
7. Subject Area: **Core Course**
8. Pre-requisite: **Physics.**

9. **Course Outcomes:**	• **Illustrate** and **Verification** of various laws in DC circuit • **Illustrate** and **Verification** of various theorems in DC circuit • **Demonstrate** various types of diodes and their characteristics • **Analysis** of various types of analog and digital electronic circuits

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.	Study of PN junction diode and its characteristics
8.	Study of ZENER junction diode and its characteristics
9.	Study of half wave rectifier with and without capacitive filter
10.	Study of full wave rectifier with and without capacitive filter
11.	Study of BJT in CB /CE configuration
12.	Verification of basic and derived gates.
13.	Realization of basic gates through universal gates.

11.	**Mode of Evaluation**	Viva / Mid Term Lab Exam / End Term Lab Exam

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.**

9. **Course Outcome:**	• acquire knowledge of structure and properties of molecules based on bonding and spectroscopic techniques • understand the chemistry of purification of water and its industrial and domestic application • classify various types of polymers and their applications • Interpret and distinguish between the different types of conventional and non-conventional fuels • apply the basic principles of electrochemistry in different electrochemical cells, corrosion control, fuel cells and industrial applications

10. **Details of the Course:**

UNIT	CONTENTS	Contact Hrs
Unit - I	**MOLECULAR STUCTURE AND SPECTROSCOPIC TECHNIQUES** 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	**8**

Unit - II	**WATER TECHNOLOGY** 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	**8**
Unit -III	**POLYMERS** **Polymers:** 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. **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, preparation, properties, and applications of PVC and Bakelite **Fibers:** Characteristics of fibers – preparation, properties and applications of Nylon and Dacron. **Conducting polymers:** Characteristics and Classification of conducting polymers with examples. **Biodegradable polymers:** Concept and advantages – Preparation of Polylactic acid and poly vinyl alcohol and their applications. **Liquid Crystalline Polymers:** Characteristics, classification with examples and their applications.	**8**
Unit –IV	**FUELS AND RENEWABLE SOURCE OF ENERGY** 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. **Renewable Energy Sources:** Solar energy, wind energy, hydroelectric and geothermal. Biofuels as alternative sources of energy (biomass, biogas).	**8**

Unit-V	**ELECTROCHEMISTRY & ITS APPLICATIONS** 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	**10**
	Total	**42**

11**. Suggested Books:**

Text Books:

1. Sunita Rattan, " Comprehensive Engineering Chemistry", S.K. Kataria& Sons Delhi, India, 2nd Edition (2009)
2. Shashi Chawala , "Theory and Practical's of Engineering Chemistry", Dhanpat Rai and Company, (Pvt) Ltd 3rd Edition (2012)
3. Jain &Jain "A text book of Engineering Chemistry," Dhanpat Rai Publishing Company, 15th Edition New Delhi (2008)

Reference Books:

1. J.D. Lee, " Concise Inorganic Chemistry", 5th Edition (1996)
2. K. L. Kapoor "A text book of Physical Chemistry" Vol. 5 , Macmillan India, 1st 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, 3rd 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**

9. **Course Outcomes:**	• Analyze the water and oil quality parameter. • Understand the concept of viscosity, surface tension and their applications. • Analyze the ores and bleaching powder sample • Knowledge of pH metric and calorimetry and their application in industry.

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 (CO_3^{2-})ions and bicarbonate (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 (Cl^-) content in the given water sample by Argentometric method (Mohr's method) using N/50 $AgNO_3$ as a standard solution and potassium chromate (K_2CrO_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 (Fe^{++}) content in given sample solution of Mohr's salt ($FeSO_4.(NH_4)_2SO_4.6H_2O$) by titrating it against standard N/30 potassium dichromate ($K_2Cr_2O_7$) solution by using potassium ferricyanide $K_3[Fe(CN)_6]$ 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 (CO_3^{2-})ions and hydroxide (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 (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, 2nd Edition (2009)
- Shashi Chawala , "Theory and Practicals of Engineering Chemistry", Dhanpat Rai and Company, India 3rd Edition (2012)

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	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** 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**

9. **Course Outcome:**	1. To create environmental awareness and knowledge. 2. To encourage participation in environmental conservation practices. 3. To develop critical thinking and apply those to the analysis of a problem or question related to the environment. 4. To evaluate impact of various human induced activities on the environment . 5. To design possible solutions to the real environmental problems. 6. To create research and innovation related with different aspects of environmental science.

10. **Details of the Course:**

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

	of the following ecosystem: • Forest ecosystem • Grassland ecosystem • Desert ecosystem • Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	
2	**Natural Resources and Biodiversity** **a.** Renewable and non- renewable resources. **b.** Natural resources and associated problems: • **Forest resources**: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. • **Water Resources**: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams – benefits and problems, water conservation, rainwater harvesting, watershed management. • **Mineral Resources**: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. • **Food Resources**: World food problems, Changes in land use by agriculture and grazing, Effects of modern agriculture, Fertilizer/ pesticide problems, Water logging and salinity • **Energy Resources**: Increasing energy needs, Renewable/ non renewable, Use of Alternate energy sources, urban problems related to energy, Case studies • **Land Resources**: Land as a resource, land degradation, man-induced land-slides, soil erosion and desertification, wasteland reclamation **c.** Role of an individual in conservation of natural resources, equitable use of resources for sustainable lifestyles. **d.** Definition of biodiversity, levels of biodiversity, value of biodiversity, threats to biodiversity (habitat loss, poaching of wildlife, man-wildlife conflicts). **e.** Biodiversity at global, national and local levels, India as a biodiversity nation, biogeographical classification of India, hotspots of biodiversity. **f.** Endangered and endemic species of India. **g.** Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.	16
3	**Environmental Pollution** **a.** Definition, causes, effects and control measures of Air Pollution,	8

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

11**. Suggested Books:**

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

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / Lab Exam

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	**Introduction to Computer Aided Sketching** 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	**Orthographic projections of points, lines and planes:** Introduction, Definitions - Planes of projection, reference line and conventions employed. First angle and Third angle projection. ***Projections of points*** in all the four quadrants. ***Projection of lines*** (located in first quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems) ***Projection of planes***: 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	**Projections of Solids:** Projections of right regular prisms, pyramids and cones with axis inclined to both the planes. (Solids resting on HP only)	**10**
4	**Development of lateral surfaces of solids:** 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	**Isometric Projections:** 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	**Demonstration of a Simple Team Design Project that Illustrates** 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**
CAD Softwares: 1. **AUTOCAD** 2. **CREO 2.0**		
Total		**75**

11. Suggested Books:

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

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam / 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. **Course Outcome:**	• The benefits of healthy life style • Importance of balanced food and proper diet in daily • Problems related to addiction and benefits of yoga • Basic first aid procedures.

10. **Details of the Course:**

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

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

10.	**Mode of Evaluation**	Test / Quiz / Assignment / End Term Exam

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
	TOTAL		**4**	**4**	**0**	**0**				**200**

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. **Course Outcome:**	• Comprehend grammatical rules so that it is easier for them to converse and write in correct English • Enhance their speaking skills through improvement in their vocabulary. • Develop an understanding of effective nonverbal expressions and speaking skills which will instill in them the confidence of a good speaker. • Demonstrate advanced interpersonal communication, business etiquette and relationship building skills • Use the skills and knowledge of communication in their professional life and in career building exercise.

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	**FUNCTIONAL GRAMMAR** 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	**VOCABULARY BUILDING** One-word substitution, Synonyms, Antonyms, Homonyms, Avoiding Indianism in usage of English language	4
3	**COMMUNICATION** Introduction to communication, Non-verbal aspects, Etiquette of telephone conversation, Role play: Mock Sessions	4
4	**EFFECTIVE HANDLING OF ISSUES** Use of concept of small talks, Giving and receiving feedback, Handling complaints effectively	3
5	**WRITTEN COMMUNICATION** Memo writing, Notice and Report writing, Agenda, Minutes of the meeting	4
	Total	**30**

11**. Suggested Books:**

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

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam

GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

SEMESTER II

Name of Department: - Professional Communication

1. Subject Code: **THU 201** Course Title: **Advanced 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: **Professional Communication**

9. **Course Outcome:**	• Understand and correctly apply rules of grammar for enhancing writing and interpersonal skills. • Develop clear thinking, ability to express and create coherence and unity in writing. • Use correct vocabulary in spoken and written English. • Evaluate and assess the speaking patterns of self and others to excel in interviews and extemporaneous speaking. • 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.

10. **Details of the Course:**

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

3	**SOFT SKILLS** 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	**TECHNICAL WRITING- I** Technical Report writing (Project report, feasibility report, research report), Research paper writing (format, RM), Technical Proposal writing (format, structure, types)	8
5	**TECHNICAL WRITING-II** Principles of business correspondence, Drafting CVs, job applications, Presentation skills	6
	Total	**30**

11**. Suggested Books:**

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

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam