

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU. Approved by AICTE

## Scheme of Teaching 2021-22

### I Semester Physics Cycle

Sl.No.	Course Code	Course Title	Department/ BOS	Contact Hours				Credits	Examination			
				Lecture	Tutorial	Practical	Project		Duration in hours	CIE	SEE	Total
				L	T	P	J					
1	21MAT111	Calculus and Linear Algebra	Mathematics	2	2	-	-	3	3	50	50	100
2	21CPC112	Programming using C (Integrated)	Computer Science & Engineering	2	2	2	-	4	3	50	50	100
3	21PHY113	Applied Physics	Physics	3	-	-	-	3	3	50	50	100
4	21BEE114	Basic Electrical Engineering (Integrated)	Electrical Engineering	3	-	2	-	4	3	50	50	100
5	21BES115	Basic Engineering Sciences	Mechanical Engineering	2	2	-	-	3	3	50	50	100
6	21PHL116	Applied Physics Lab & Project	Physics	-	-	2	-	1	3	50	50	100
7	21IDT117	Innovation & Design Thinking	Mechanical Engineering	-	2	-	-	1	1	50	50	100
8	21LCA118	Liberal Arts and Creative Arts / MOOCs	Humanities	-	-	2	-	1	1	50	50	100
9	21SFH119	Scientific Foundation of Health	Sports	-	-	1	-	NCMC	1	50	50	100
<b>Total</b>				<b>12</b>	<b>8</b>	<b>9</b>	<b>0</b>	<b>20</b>		<b>450</b>	<b>450</b>	<b>900</b>
				29								

### I Semester Chemistry Cycle

Sl.No.	Course Code	Course Title	Department/ BOS	Contact Hours				Credits	Examination			
				Lecture	Tutorial	Practical	Project		Duration in hours	CIE	SEE	Total
				L	T	P	J					
1	21MAT111	Calculus and Linear Algebra	Mathematics	2	2	-	-	3	3	50	50	100
2	21CPC112	Programming using C (Integrated)	Computer Science & Engineering	2	2	2	-	4	3	50	50	100
3	21CHE113	Applied Chemistry	Chemistry	3	-	-	-	3	3	50	50	100
4	21BEC114	Basic Electronics & Communication Engineering (Integrated)	Electronics & Communication Engineering	3	-	2	-	4	3	50	50	100
5	21EGD115	Engineering Graphics & Design (Integrated)	Mechanical Engineering	-	2	2	-	2	3	50	50	100
6	21CHL116	Chemistry Lab & Project	Chemistry	-	-	2	-	1	3	50	50	100
7	21ECS117	Professional Communication & Soft Skills	Humanities	-	2	2	-	2	1	50	50	100
8	21EVS118	Environmental Science	Humanities	-	2	-	-	1	1	50	50	100
9	21SFH119	Scientific Foundation of Health	Sports	-	-	1	-	NCMC	1	50	50	100
<b>Total</b>				<b>10</b>	<b>10</b>	<b>11</b>	<b>0</b>	<b>20</b>		<b>450</b>	<b>450</b>	<b>900</b>
				31								

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**CIE: Continuous Internal Evaluation, SEE: Semester End Examination, NCMC: Non Credit Mandatory Course**

AICTE Activity Points to be earned by students admitted to BE day college programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines): Over and above the academic grades, every Day College regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other institutions and Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to BNMIT. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

# B.N.M. Institute of Technology

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## Scheme of Teaching 2021-22

### II Semester Physics Cycle

Sl.No.	Course Code	Course Title	Department/ BOS	Contact Hours				Credits	Examination				
				Lecture	Tutorial	Practical	Project		Duration in hours	CIE	SEE	Total	
				L	T	P	J						
1	21MAT121	Advanced Calculus, Laplace Transform & Numerical Methods	Mathematics	2	2	-	-	3	3	50	50	100	
2	21PSC122	Problem Solving using C (Integrated)	Computer Science & Engineering	2	-	2	2	4	3	50	50	100	
3	21PHY123	Applied Physics	Physics	3	-	-	-	3	3	50	50	100	
4	21BEE124	Basic Electrical Engineering (Integrated)	Electrical Engineering	3	-	2	-	4	3	50	50	100	
5	21BES125	Basic Engineering Sciences	Mechanical Engineering	2	2	-	-	3	3	50	50	100	
6	21PHL126	Applied Physics Lab & Project	Physics	-	-	2	-	1	3	50	50	100	
7	21IDT127	Innovation & Design Thinking	Mechanical Engineering	-	2	-	-	1	1	50	50	100	
8	21LCA128	Liberal Arts and Creative Arts / MOOCs	Humanities	-	-	2	-	1	1	50	50	100	
9	21SFH129	Scientific Foundation of Health	Sports	-	-	1	-	NCMC	1	50	50	100	
<b>Total</b>				12	6	9	2	20		450	450	900	
				29									

### II Semester Chemistry Cycle

Sl.No.	Course Code	Course Title	Department/ BOS	Contact Hours				Credits	Examination				
				Lecture	Tutorial	Practical	Project		Duration in hours	CIE	SEE	Total	
				L	T	P	J						
1	21MAT121	Advanced Calculus, Laplace Transform & Numerical Methods	Mathematics	2	2	-	-	3	3	50	50	100	
2	21CPC122	Problem Solving using C (Integrated)	Computer Science & Engineering	2	-	2	2	4	3	50	50	100	
3	21CHE123	Applied Chemistry	Chemistry	3	-	-	-	3	3	50	50	100	
4	21BEC124	Basic Electronics & Communication Engineering (Integrated)	Elelectronics & Communication Engineering	3	-	2	-	4	3	50	50	100	
5	21EGD125	Engineering Graphics & Design (Integrated)	Mechanical Engineering	-	2	2	-	2	3	50	50	100	
6	21CHL126	Chemistry Lab & Project	Chemistry	-	-	2	-	1	3	50	50	100	
7	21ECS127	Professional Communication & Soft Skills	Humanities	-	2	2	-	2	1	50	50	100	
8	21EVS128	Environmental Science	Humanities	-	2	-	-	1	1	50	50	100	
9	21SFH129	Scientific Foundation of Health	Sports	-	-	1	-	NCMC	1	50	50	100	
<b>Total</b>				10	8	11	2	20		450	450	900	
				31									

**CIE: Continuous Internal Evaluation, SEE: Semester End Examination, NCMC: Non Credit Mandatory Course**

AICTE Activity Points to be earned by students admitted to BE day college programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines): Over and above the academic grades, every Day College regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other institutions and Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to BNMIT. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

# *B.N.M. Institute of Technology*

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## **Department of Mathematics Scheme for Autonomous batch : 2021 - 2025**

<b>COMMON TO ALL B.E. PROGRAMS</b>												
Sl. No.	Course code	Course Title	Department/ BOS	Semester	Contact Hours				Credits	Examination		
					Lecture	Tutorial	Practical	Project		CIE	SEE	Total Marks
					L	T	P	J				
1	21MAT111	Calculus and Linear Algebra	Mathematics	I	2	2	0	0	3	50	50	100
2	21MAT121	Advanced Calculus , Laplace transform and Numerical Methods	Mathematics	II	2	2	0	0	3	50	50	100
3	21MAT131	Fourier Series, Transforms and Complex Analysis	Mathematics	III	2	2	0	0	3	50	50	100
4	21MAT141	Statistical Techniques and Probability	Mathematics	IV	2	2	0	0	3	50	50	100
5	21MDP131	Additional Mathematics - I	Mathematics	III	3	0	0	0	0	50	50	100
6	21MDP141	Additional Mathematics - II	Mathematics	IV	3	0	0	0	0	50	50	100

<b>M. Tech (Computer Science &amp; Engineering)</b>												
Sl. No.	Course code	Course Title	Department/ BOS	Semester	Contact Hours				Credits	Examination		
					Lecture	Tutorial	Practical	Project		CIE	SEE	Total Marks
					L	T	P	J				
1	21MAT211	Mathematical Foundation of Computer Science	Mathematics	I	2	2	0	0	3	50	50	100

CIE: Continuous Internal Evaluation, SEE: Semester End Examination

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU, Approved by AICTE

## **Department of Basic Science**

### **Open Elective Courses for Autonomous batch: 2021 – 2025**

Sl. No.	Course code	Course Title	Department/ BOS	Semester	Contact Hours				Credits	Examination		
					Lecture	Tutorial	Practical	Project		CIE	SEE	Total Marks
					L	T	P	J				
1	21BSC1661	Advanced Linear Algebra	Mathematics	VI	3	-	-	-	3	50	50	100
2	21BSC1662	Photonics and Optoelectronics	Physics	VI	3	-	-	-	3	50	50	100
3	21BSC1663	Advanced Material Science and Engineering	Chemistry	VI	3	-	-	-	3	50	50	100

CIE: Continuous Internal Evaluation, SEE: Semester End Examination

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU, Approved by AICTE

## Department of Mathematics

### Draft Syllabus

Semester: I			
Course: Calculus and Linear Algebra			
Course Code: 21MAT111			
<b>L:T:P:J</b>	<b>2:2:0:0</b>	<b>CIE:</b>	<b>50</b>
<b>Credits:</b>	<b>03</b>	<b>SEE:</b>	<b>50</b>
<b>Hours:</b>	<b>40</b>	<b>SEE Duration:</b>	<b>03 Hours</b>
<b>Course Learning Objectives: The students will be able to</b>			
1	Familiarize the important tools of calculus and differential equations those are essential in all branches of engineering.		
2	Develop the knowledge of linear algebra in a comprehensive manner.		
Module-1: Differential Calculus		No. of hours	Blooms cognitive Levels=
Review of elementary differential calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian and Polar forms (Problems only), Taylor and Maclaurin series expansions for one variable (Problems only). <b>Problem Solving (Tutorials)</b> <b>Self-study component:</b> Problems on Taylor and Maclaurin series.		<b>L : 04</b>  <b>T : 04</b>	<b>Apply</b>
Module-2: Partial Differentiation			
Introduction to partial differentiation, Euler's theorem on homogeneous functions, Total differentiation, differentiation of composite functions and implicit functions, Jacobians and related problems, maxima and minima for a function of two variables and its applications, Method of Lagrange multipliers with one subsidiary condition. <b>Problem Solving (Tutorials)</b> <b>Self-study component:</b> Problems on Euler's theorem and Jacobian of Composite function.		<b>L : 04</b>  <b>T : 04</b>	<b>Apply</b>
Module-3: Integral Calculus			
Review of elementary integral calculus. Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals - change of order of integration and changing into polar co-ordinates. Applications to find area, volume and centre of gravity. Gamma and Beta functions as integrals: Definitions, Relation between beta and gamma functions.		<b>L : 04</b>	<b>Apply</b>

<p><b>Problem Solving (Tutorials)</b></p> <p><u><b>Self-study component:</b></u> Problems on area , volume and centre of gravity.</p>	<p><b>T : 04</b></p>	
<p><b>Module-4: First Order Differential Equations</b></p>		
<p>Linear and Non linear differential equations: Exact and reducible to exact differential equations. Bernoulli’s Linear differential equation. Applications of ODE’s-orthogonal trajectories, Newton’s law of cooling and L - R circuits. Non-linear differential equations, general and singular solutions; solvable for p only and Clairaut’s equation.</p> <p><b>Problem Solving (Tutorials)</b></p> <p><u><b>Self-study component:</b></u> Problems on reducible to Clairaut’s equation.</p>	<p><b>L : 04</b></p> <p><b>T : 04</b></p>	<p><b>Apply</b></p>
<p><b>Module-5: Linear Algebra</b></p>		
<p>Review of matrices, rank of a matrix-echelon form, solution of system of linear equations - consistency. Direct methods: Gauss-elimination method, Crout’s LU Decomposition method. Iterative method: Gauss-Seidel iterative method. Eigen values and eigenvectors - Rayleigh’s power method to find largest eigen value and the corresponding eigen vector, Diagonalization of a matrix.</p> <p><b>Problem Solving (Tutorials)</b></p> <p><u><b>Self-study component:</b></u>  Eigen values and Eigen vectors – problems, Rayleigh’s power method to find least eigen value and the corresponding eigen vector.</p>	<p><b>L : 04</b></p> <p><b>T : 04</b></p>	<p><b>Apply</b></p>

<p><b>Course Outcomes: After completing the course, the students will be able to</b></p>	
<p>CO 1</p>	<p>Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.</p>
<p>CO 2</p>	<p>Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.</p>
<p>CO 3</p>	<p>Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.</p>
<p>CO 4</p>	<p>Solve first order linear /non linear differential equation analytically using standard methods</p>
<p>CO 5</p>	<p>Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.</p>

**Text Books:**

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.
2. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.

**Reference Books:**

1. C.Ray Wylie, Louis C.Barrett : “Advanced Engineering Mathematics”, 6th Edition, 2. McGraw-Hill Book Co., New York, 1995.
2. James Stewart : “Calculus —Early Transcendentals”, Cengage Learning India Private Ltd., 2017.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Srimanta Pal & Subobh C Bhunia: “Engineering Mathematics”, Oxford University Press, 3rd Reprint, 2016.
5. Gupta C.B., Singh S.R. and Mukesh Kumar: “Engineering Mathematics for Semester I & II”, Mc-Graw Hill Education(India) Pvt.Ltd., 2015.

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU, Approved by AICTE

## Department of Mathematics

### Draft Syllabus

Semester: II			
Course: Advanced Calculus , Laplace transform and Numerical Methods			
Course Code: 21MAT121			
L:T:P:J	2:2:0:0	CIE:	50
Credits:	03	SEE :	50
Hours:	40	SEE Duration:	03 Hours
<b>Course Learning Objectives: The students will be able to</b>			
1	Familiarize the important tools of vector calculus, ordinary/partial differential equations and Laplace Transforms to analyze the engineering problems.		
2	Apply the knowledge of interpolation/extrapolation and numerical integration technique whenever analytical methods fail or very complicated, to offer solutions.		
Module - 1: Vector Calculus		No. of Hours	Blooms cognitive Levels
<b>Vector Differentiation:</b> Scalar and vector fields. Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields and vector identities (statement only). <b>Vector Integration:</b> Line integrals, Theorems of Green, Gauss and Stokes (without proof). Applications: (i). work done by force (ii). flux. <b>Problem Solving (Tutorials)</b> <u><b>Self-study component:</b></u> Problems on vector identities, work done by force and flux		<b>L : 04</b>  <b>T : 04</b>	<b>Apply</b>
Module - 2: Higher Order Differential Equations			
Second order linear ODE's with constant coefficients-Inverse differential operators, method of variation of parameters; Cauchy's and Legendre homogeneous equations. Applications to oscillations of a spring and L-C-R circuits. <b>Problem Solving (Tutorials)</b> <u><b>Self-study component:</b></u> Problems on Cauchy's and Legendre homogeneous equations		<b>L : 04</b>  <b>T : 04</b>	<b>Apply</b>
Module - 3: Partial Differential Equations			
Formation of PDE's by elimination of arbitrary constants / functions, Solution of non-homogeneous PDE by direct integration, Solution of Lagrange's linear equation. Solution of one dimension wave and heat equations by method of separation of variables.		<b>L : 04</b>	<b>Apply</b>

<p><b>Problem Solving (Tutorials)</b></p> <p><b><u>Self-study component:</u></b></p> <p>Solution of Laplace equation in two dimensions by the method of separation of variables.</p>	<p><b>T : 04</b></p>	
<p><b>Module - 4: Laplace Transform</b></p>		
<p><b>Laplace Transform:</b> Transformation for time domain to frequency domain, Laplace transforms of elementary functions. Laplace transform of <math>e^{at} f(t)</math>, <math>t^n f(t)</math> and <math>\frac{f(t)}{t}</math> (without proof), Periodic functions (statement only) and unit-step function – problems.</p> <p><b>Inverse Laplace Transform:</b> Definition and problems, Convolution theorem to find the inverse Laplace transforms (without Proof) and problems. Solution of linear differential equations of second order, solution of simultaneous linear differential equations of first order using Laplace transforms.</p> <p><b>Problem Solving (Tutorials)</b></p> <p><b><u>Self-study component:</u></b></p> <p>Solution of linear differential equations of third order using Laplace transforms</p>	<p><b>L : 04</b></p> <p><b>T : 04</b></p>	<p><b>Apply</b></p>
<p><b>Module - 5: Numerical Methods</b></p>		
<p><b>Finite differences.</b> Interpolation / extrapolation using Newton’s forward and backward difference formulae, Newton’s divided difference and Lagrange’s interpolation formulae (without proof). Solution of algebraic and transcendental equations– Newton-Raphson and Secant methods (without proof) - Illustrative examples.</p> <p><b>Numerical integration:</b></p> <p>Trapezoidal rule and Simpson's (1/3)rd (without proof) —Problems.</p> <p><b>Problem Solving (Tutorials)</b></p> <p><b><u>Self-study component:</u></b></p> <p>Problems on extrapolation</p>	<p><b>L : 04</b></p> <p><b>T : 04</b></p>	<p><b>Apply</b></p>

<p><b>Course Outcomes: After completing the course, the students will be able to</b></p>	
<p>CO 1</p>	<p>Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the interdependence of line, surface and volume integrals.</p>
<p>CO 2</p>	<p>Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.</p>
<p>CO 3</p>	<p>Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.</p>
<p>CO 4</p>	<p>Use Laplace transform and inverse Laplace transform in solving differential / integral Equations arising in network analysis, control systems and other fields of engineering.</p>
<p>CO 5</p>	<p>Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena</p>

**Text Books:**

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.
2. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.

**Reference Books:**

1. C.Ray Wylie, Louis C.Barrett : “Advanced Engineering Mathematics”, 6th Edition, 2. McGraw-Hill Book Co., New York, 1995.
2. James Stewart : “Calculus —Early Transcendentals”, Cengage Learning India Private Ltd., 2017.
3. B.V.Ramana: "Higher Engineering Mathematics" II<sup>th</sup> Edition, Tata McGraw-Hill, 2010.
4. Srimanta Pal & Subobh C Bhunia: “Engineering Mathematics”, Oxford University Press, 3rd Reprint, 2016.
5. Gupta C.B., Singh S.R. and Mukesh Kumar: “Engineering Mathematics for Semester I & II”, Mc-Graw Hill Education(India) Pvt.Ltd., 2015.

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU

Department of Computer Science and Engineering

## Programming using C

### SEMESTER- I

Subject Code: 21CPC112	L:T:P:J: 2:0:4:0	CIE :	50
Credits:	4	SEE :	50
Total Number of Lecture Hours	50	SEE Duration:	3 Hours

Course objectives:

- To understand basic principles of C programming language
- To provide practical exposures like designing flowcharts, algorithms, how to debug programs etc.
- Learn and use syntax of c programming language to solve basics science and engineering problems.
- Use of arrays and functions to build solutions to variety of problems.

#### Module 1: Introduction

Teaching Hours

##### Concept Learning

Introduction to Computers; Input and Output Devices; Number Systems; Computer Memory; Computer Software; Introduction to Computer Networks; Types of Network, Networking devices. Introduction to Algorithms, Flowcharts and Programming Languages.

10

##### Practical session:

Pen & Paper Practice.

#### Module 2: Introduction to C

##### Concept Learning

Overview of C; Constants, Variables and Data Types; Operators and Expressions; Managing Input and Output Operations.

10

##### Practical session:

Tracing Exercises, Analysis Exercises, Exercises to Modify programs.

#### Module 3: Branching and Looping Statements

##### Concept Learning

Introduction; Decision making with if, if else, Nesting of if else , else if ladder and switch statement; Looping Statements- while, do and for loop; Nested Loops Unconditional Branching / Jumps in Loops – goto, break , continue and return;

10

##### Practical session:

Tracing Exercises, Analysis Exercises, Exercises to Modify programs.

#### Module 4: Arrays and Strings

##### Concept Learning

Introduction; One Dimensional Arrays; Two- Dimensional Arrays; Multi Dimensional Arrays; Strings- Introduction, Declaration, Reading and Writing Strings, Character Manipulation functions , String Handling Functions

10

##### Practical session:

Tracing Exercises, Analysis Exercises, Exercises to Modify programs.

<b>Module 5 : Functions</b>		
<b>Concept Learning</b> Introduction; Library Functions; Need for User Defined Functions; Elements of User Defined Functions; Category of Functions; Passing Arrays to Functions; Passing Strings to Functions; Scope Visibility and Lifetime of Variables; Storage Classes	<b>10</b>	
<b>Practical session:</b> Tracing Exercises, Analysis Exercises, and Exercises to Modify programs.		

CO. No	Course Outcome	Blooms Level
21CPC112.1	Understand the fundamental computer concepts and programming principles.	Understand
21CPC112.2	Analyze the logic through algorithms and flowcharts.	Analyze
21CPC112.3	Apply appropriate data structures to solve problems.	Apply
21CPC112.4	Construct a programming solution to the given problem using C.	Create

### **Text Books**

1. Computer Fundamentals and Programming in C - Reema Thareja: Oxford University Press, Second Edition
2. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill
3. Jacqueline Jones & Keith Harrow: Problem Solving with C, 1<sup>st</sup> Edition, Pearson 2012.

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU

Department of Computer Science and Engineering

Problem Solving using C

SEMESTER- II

Subject Code: 21PSC122	L:T:P:J: 2:0:2:2	CIE :	50
Credits:	4	SEE :	50
Total Number of Lecture Hours	50	SEE Duration:	3 Hours

Course objectives:

- Define and use of pointers with simple applications.
- Use and implement structures to obtain solutions.
- Acquire knowledge on file management.
- Implement programming solutions to the given problem

<b>Module 1: Recursion and Pointers</b>	<b>Teaching Hours</b>
<b>Concept Learning</b> Introduction; Recursive Function; Recursion Vs Iteration; Understanding Computer memory; Introduction to pointers; Declaration; Pointer Expressions and Pointer Arithmetic; Null and Generic Pointers, Pointers to Functions; Pointers to Arrays; Pointers to Strings; Array of Pointers; Pointers to Pointers;	<b>10</b>
<b>Practical session:</b> Tracing Exercises, Analysis Exercises, Exercises to Modify programs.	
<b>Project</b> <ul style="list-style-type: none"><li>➤ Team Members</li><li>➤ Title of the project – Title should map to a real time applications</li></ul>	
<b>Module 2 : Structures and unions</b>	
<b>Concept Learning</b> Introduction – Declaration, Initialization and Accessing members of Structures; Arrays within Structures; Nested Structures; Array of Structures; Structures and Functions; Self Referential Structures; Unions; Enumerated Data Types	<b>10</b>
<b>Practical session:</b> Tracing Exercises, Analysis Exercises, Exercises to Modify programs.	
<b>Project</b> <ul style="list-style-type: none"><li>➤ Problem Definition</li><li>➤ Description of Application / Case Study</li></ul>	
<b>Module 3: File Management</b>	
<b>Concept Learning</b> Introduction to Files; Using Files in C, Input/output Operations on Files; Error Handling; Random Access to Files and Command Line Arguments	<b>10</b>
<b>Practical session:</b> Tracing Exercises, Analysis Exercises, Exercises to Modify programs.	

<b>Project</b> ➤ Modules of the Project ○ Choice for action ○ Algorithms to perform action	
<b>Module 4: Preprocessor Directives</b>	
<b>Concept Learning</b> Introduction; Types; Macro Substitution; File Inclusion; Compiler Control Directives	<b>10</b>
<b>Practical session:</b> Tracing Exercises, Analysis Exercises, Exercises to Modify programs.	
<b>Module 5 : Dynamic Memory Allocation</b>	
<b>Concept Learning</b> Dynamic Memory Allocation; Memory models; Memory allocation Functions;	<b>10</b>
<b>Practical session:</b> Tracing Exercises, Analysis Exercises, Exercises to Modify programs.	

CO. No	Course Outcome	Blooms Level
21PSC122.1	Understand the fundamental computer concepts and programming principles.	Understand
21PSC122.2	Analyze the logic through algorithms and flowcharts.	Analyze
21PSC122.3	Apply appropriate data structures to solve problems.	Apply
21PSC122.4	Construct a programming solution to the given problem using C.	Create
21PSC122.5	Analyze and Develop optimized programming solutions to solve real world problems.	Create

### Text Books

1. Computer Fundamentals and Programming in C - Reema Thareja: Oxford University Press, Second Edition
2. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill
3. Jacqueline Jones & Keith Harrow: Problem Solving with C, 1<sup>st</sup> Edition, Pearson 2012.

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU

## Department of Physics

Semester: I/II				
Course Title: Applied Physics				
Course Code: 21PHY113/123	L:T:P:J: 3:0:0:0	CIE:	50	
Credits:	3	SEE:	50	
Hours:	40	SEE Duration:	03 Hours	
<b>Course Learning Objective : The Objective of the course is to</b>				
1	Understand and apply the concepts of Modern Physics and Quantum mechanics in engineering applications.			
2	Demonstrate the engineering applications of Lasers and Optical fibres by applying their principles.			
3	Explain electrical properties of metals and semiconductors by applying quantum mechanical concepts.			
4	Understand and apply the concepts of elastic properties of materials in engineering applications.			
5	Understand the basic properties of nanomaterials and composite materials, and demonstrate their applications in modern engineering fields.			
<b>Module 1 – Modern Physics &amp; Quantum Mechanics</b>			<b>RBT</b>	<b>Hrs</b>
<b>Pre-requisite:</b> Particle nature of Light radiations – Photo electric effect and Black Body Radiation Spectrum, Planck’s law of radiation. <b>Teaching Component:</b> Need of modern Physics, de-Broglie’s hypothesis of Matter Waves, group velocity & phase velocity (qualitative), Heisenberg Uncertainty Principle, Applications of Heisenberg Uncertainty Principle (Non-existence of electrons inside nucleus). Wave function and its significance. Time independent one-dimensional Schrodinger equation (derivation), time dependent (qualitative). Particle in a potential well of infinite height (Eigen values and Eigen functions). Finite well potential (qualitative), Quantum Tunnelling (qualitative), Numerical problems. <b>Self-Study Component:</b> Existence of nucleons inside nucleus using Heisenberg Uncertainty Principle, Quantum bits, Quantum computer.			<b>Applying</b>	<b>08 Hrs</b>
<b>Module-2: Lasers and Optical Fibers</b>				
<b>Pre-requisite:</b> Interaction of radiation with matter and characteristic properties of laser, Reflection, Refraction & TIR <b>Teaching Component:</b> <b>2.1: LASER:</b> Energy density of a photon at equilibrium in terms of Einstein’s coefficients (derivation) – Discussion on various conditions on Laser action, Requisites of Laser, Three & four level laser systems, Construction and working of Ruby and Nd-YAG Lasers. Engineering Applications of Lasers: LIDAR and Data Storage, Numerical Problems. <b>2.2: Optical fibers:</b> Introduction to optical fibers, Propagation mechanism in optical fibers, Acceptance angle and Numerical Aperture (derivation), Types of Optical fibers, Attenuation in optical fibers and its mechanisms, Engineering Applications of optical fibers – Point to point communication, Numerical problems. <b>Self-Study Component:</b> Semiconductor Laser, Industrial Applications of Laser: Laser welding, Laser cutting & Laser drilling, Applications of Optical fiber using Laser - Endoscopy			<b>Applying</b>	<b>08Hrs</b>

<b>Module-3: Electrical properties of materials</b>		
<p><b>Pre-requisite:</b> Free electron theory of metals, Ohm's Law in terms of current density, Electric Dipoles, Dipole moment and Fundamentals of dielectrics.</p> <p><b>Teaching Component:</b></p> <p><b>3.1 Metals:</b> Quantum free electron theory – Assumptions, Density of states (qualitative), Fermi energy and Fermi factor, Effect of temperature on fermi factor, Expression for Fermi energy (derivation) at absolute zero temperature and at certain higher temperature (qualitative), effective mass (qualitative), Electrical conductivity in metals based on quantum free electron theory (derivation), Numerical Problems.</p> <p><b>3.2 Dielectric Materials:</b> Polarization and its types, Relation between dielectric constant and polarization (qualitative). Internal field and expression for internal field in solids for one-dimensional (derivation) and three dimensional cases (qualitative). Clausius-Mossotti equation (derivation). Application of dielectrics in transformers. Numerical Problems.</p> <p><b>Self-Study Component:</b> Applications of Quantum free electron theory, Dielectric materials as sensors and actuators</p>	<b>Applying</b>	<b>08 Hrs</b>
<b>Module-4: Mechanical Properties of materials</b>		
<p><b>Pre-requisite:</b> Concept of Stress and Strain - Hooke's Law, Elastic Modulus.</p> <p><b>Teaching Component:</b> Stress-Strain diagram, Types of stress &amp; strain, Types of elastic moduli, Poisson's ratio, Relations between <math>Y</math>, <math>\eta</math>, <math>K</math> and <math>\sigma</math> (derivation). Types of beams, concept of Bending moment, Expression for bending moment (qualitative), Applications: Single cantilever - Young's modulus of cantilever (derivation), Concept of torsion, Rigidity modulus of a solid cylinder (derivation), Numerical problems.</p> <p><b>Self-Study Component:</b> Cantilever beam as an aircraft wing (Vibrational analysis)</p>	<b>Applying</b>	<b>08 Hrs</b>
<b>Module-5: Modern Engineering Materials</b>		
<p><b>5.1 Nano Materials:</b> Introduction to Nano science and Nano materials, Surface to volume ratio, Quantum confinement – Quantum well, Quantum wire, Quantum dot. Synthesis of Nano materials – Top-down approach (Ball milling method) and bottom-up approach (Chemical Vapour Deposition Technique-CVD). Carbon Nano tubes, types, properties, Synthesis of carbon nano tubes - Arc discharge method, Applications. Scanning Electron Microscope (SEM), Application of SEM in analysis of Molecular size, Numerical problems.</p> <p><b>5.2 Composite Materials:</b> Introduction to composite materials, Classification of composites based on reinforcement materials and matrix. Advantages and disadvantages of composite materials, Engineering Applications – Smart materials and smart structures, Micro Electromechanical Structures (MEMS).</p> <p><b>Self-Study Component:</b> Engineering Applications of Nano materials – Drug delivery system. Engineering Applications of composite materials – Shape memory alloys (SMA).</p>	<b>Applying</b>	<b>08 Hrs</b>

<b>Course Outcomes: After completing the course, the students will be able to</b>	
21PHY113/123.1	Apply the concepts of Modern Physics and Quantum mechanics to physical situations/engineering problems.
21PHY113/123.2	Apply principles of lasers and Optical fibres in the field of engineering.
21PHY113/123.3	Apply the quantum concepts to explain electrical properties materials.
21PHY113/123.4	Apply the theory of elasticity in engineering applications.
21PHY113/123.5	Apply the basics of Nano and Composite materials to the field of engineering.
<b>Text Books</b>	
<ol style="list-style-type: none"> <li>1. Engineering Physics by R.K. Gaur and Gupta, Dhanpat Rai Publications, 8th Edition, 2011.</li> <li>2. A Text Book of Engineering Physics by M.N. Avadhanulu, S. Chand &amp; Co.Ltd., 9th Edition.</li> <li>3. Textbook of Nanoscience and Nanotechnology by B.S.Murthy, P.Shankar and et al., Springer, 2019.</li> </ol>	
<b>Reference Books</b>	
<ol style="list-style-type: none"> <li>4. Concepts of Modern Physics, Arthur Beiser, Tata McGraw Hill Education Pvt.Ltd., Seventh Edition, 2015.</li> <li>5. Principle of Quantum Mechanics: Concepts &amp; Applications, Nouredine Zettili, Wiley, 2<sup>nd</sup> Edition, 2009.</li> <li>6. Lasers and Non-linear optics, B.B. Laud, New Age International Publishers, 3<sup>rd</sup> Edition, 2011.</li> <li>7. Lasers and Optical Instrumentation, S. Nagabhushana and B. Sathyanarayana, I.K. International Publishing House Pvt. Ltd, 2013.</li> <li>8. Solid State Physics, S.O. Pillai, New Age International Publishers, 9<sup>th</sup> Edition, 2020.</li> <li>9. Introduction to Nanoscience and Nanotechnology, Chris Binns, Wiley, 2010.</li> <li>10. An Introduction to Composite Materials, T.W. Clyne and D. Hull, Cambridge University Press, 3<sup>rd</sup> Edition, 2019.</li> </ol>	

## Department of Physics

Semester: I/II			
Course Title: Applied Physics Lab & Project			
<b>Course Code:</b> 21PHL116/126	<b>L:T:P:J: 0:0:2:0</b>	<b>CIE:</b>	50
<b>Credits:</b>	<b>1</b>	<b>SEE:</b>	<b>50</b>
<b>Weeks:</b>	<b>14</b>	<b>SEE Duration:</b>	<b>03 Hours</b>
<b>Course Learning Objectives: This course will enable students to</b>			
<b>1</b>	Gain practical knowledge to correlate with theoretical studies in general physics, lasers, optical fibres, electrical, electronics, mechanical properties of materials.		
<b>2</b>	Execute mini-project by applying practical knowledge into an engineering problems and to get exposed to real-world situation.		
<b>List of Experiments:</b>			<b>Module mapping</b>
1. Determination of Planck's constant			I
2. Photo Diode Characteristics			I
3. Study of Laser Characteristics			II
4. Determination of wavelength of laser using diffraction grating.			II
5. Determination of Acceptance angle and Numerical Aperture of an Optical fibre			II
6. Determination of resistivity and mobility of charge carriers in a given metal.			III
7. Determination of Fermi energy of copper			III
8. Determination of dielectric constant of a dielectric material			III
9. Young's Modulus of material of a beam using Single Cantilever			IV
10. Rigidity modulus of material of a wire using Torsional Pendulum			IV
11. Course Project			<b>01 Project</b>

### Sample course projects:

1. Measuring the radiant intensity of a 'Black Body' as a function of temperature.
2. The Comparison of Thermal Conductivity for Different Metals and analysis using quantum mechanical concepts.
3. Measurement of thickness of a micro object using air wedge method.
4. Identifying the type of particles in a sample by analyzing their laser light scattering properties.
5. Study of the transmission efficiency of the different materials for a laser light
6. Pressure sensor using optical fiber
7. Detection of mechanical resonance of a vibrating crystal oscillator
8. Hall effect sensor magnetic Switch
9. Determination of Young's modulus of a composite material
10. Green Synthesis of Nanoparticles (Catalyst/reducing agent - Plant extract – leaves, fruit, vegetable, seed)

<b>Course Outcomes: After completing the course, the students will be able to</b>		
<b>CO No.</b>	<b>Statement</b>	<b>Bloom's Cognitive Level</b>
21PHL116/126.1	Determine physical parameters required to explain the concepts of modern physics and quantum mechanics.	APPLY
21PHL116/126.2	Determine physical parameters relevant to lasers and optical fibers.	APPLY
21PHL116/126.3	Determine physical parameters relevant electrical properties of metals and dielectric materials	APPLY
21PHL116/126.4	Determine elastic constants to explain mechanical properties of materials.	APPLY
21PHL116/126.5	Design and develop - mini projects	APPLY

<b>Reference Books</b>
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- |   |
|---|
| <ol style="list-style-type: none"> <li>1. University Practical Physics by D.C. Tayal, Edited by ILA Agarwal, 2000, Himalaya Publishing House, Mumbai.</li> <li>2. Engineering Physics Laboratory Manual (BNMIT).</li> </ol> |
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<b>Semester: I/II</b>		
<b>Applied Chemistry</b>		
<b>Course Code:</b> 21CHE113/123	<b>3:0:0:0:</b>	<b>CIE Marks:</b> 50
<b>Credits:</b> 3		<b>SEE Marks:</b> 50
<b>Hours:</b> 40		<b>SEE Duration:</b> 03 Hours
<b>Course Learning Objectives: The students will be able to</b>		
1	Master the basic knowledge of applied chemistry in their day to day life, various types of industries and in research and development	
2	To develop knowledge in the field of electrochemistry and energy systems, Corrosion and metal finishing	
3	To understand the concept and fundamental principles of green chemistry, water and polymer Technology	
<b>Module-1: Corrosion Science and Engineering</b>		
<b>Pre-requisite:</b> Electrochemical series, material properties		<b>No. of Hrs</b>
<b>Teaching component: Corrosion:</b> Importance of corrosion in industry, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion - Differential metal, differential aeration - pitting and water line). Corrosion control: Anodizing – Anodizing of aluminium, Cathodic protection - sacrificial anode and impressed current methods, Metal coatings – Galvanization.		<b>4</b>
<b>Metal finishing:</b> Technological importance. Electroplating: Factors affecting the nature of electrodeposits (Metal ion concentration, Current density, Temperature, pH and Organic additives). Electroplating of chromium (hard and decorative). Electroless plating: electroless plating of nickel, copper on PCB, distinction between electroplating and electroless plating processes.		<b>4</b>
<b>Case study: Material failure</b>		
<b>Self Study:</b> Electroless plating of nickel, distinction between electroplating and electroless plating processes		
<b>Module-2: Electrochemical Energy Systems</b>		
<b>Pre-requisite:</b> Electrodes, Single electrode potential, EMF		
<b>Teaching component: Electrochemistry:</b> Derivation of Nernst equation for single electrode potential and its significance. Numerical problems on E, E <sup>0</sup> , and E <sub>cell</sub> .		
Reference electrodes: construction, working and applications of Calomel electrode. Ion-selective electrode – construction, working and determination of pH using glass electrode. Electrolyte		<b>5</b>

<p>concentration cells, numerical problems.</p> <p><b>Energy storage systems:</b> Classification – primary, secondary and reserve batteries. Battery characteristics (Voltage, Capacity, Energy density, electricity storage density, Cycle life and Shelf life), Construction, working and applications of Classical battery – Lead acid battery. Modern Battery in Electric vehicles (Li-ion battery) and recycling of Li-ion battery (Hydrometallurgy &amp; Pyrometallurgy).</p> <p><b>Case study: Batteries used in electronic gadgets</b></p> <p><b>Self Study: Modern batteries</b></p>	3	Analyze
<b>Module-3: Energy Systems</b>		
<p><b>Pre-requisite:</b> Renewable and non-renewable energy sources, Redox reactions.</p> <p><b>Teaching component:</b> Green Chemistry: Introduction, Twelve Principles of Green Chemistry, Atom Economy-Numerical problems. Alternative feedstock's; power alcohol and synthesis of biodiesel.</p> <p><b>Fuel Cells:</b> Differences between conventional cell and fuel cell, limitations &amp; advantages. Construction, working &amp; applications of methanol-oxygen fuel cell with H<sub>2</sub>SO<sub>4</sub> as electrolyte, and solid oxide fuel cell (SOFCs).</p> <p><b>Solar Energy:</b> Preparation of solar grade silicon by Union Carbide Process. Photovoltaic cells-construction and working of a typical PV cell. Advantages and Improvements in photovoltaic cells (Tandem solar cell).</p> <p><b>Case study: Renewable energy sources</b></p> <p><b>Self Study:</b> Differences between conventional cell and fuel cell, next generation solar cells.</p>	3  2  3	Analyze
<b>Module-4: Chemical Technology</b>		
<p><b>Pre-requisite:</b> Sources and impurities in water, osmosis, polymers and its properties.</p> <p><b>Teaching component: Water Technology:</b> Boiler corrosion (due to dissolved O<sub>2</sub>, CO<sub>2</sub> and MgCl<sub>2</sub>). Determination of COD, numerical problems on COD. Chemical analysis of water: residual chlorine (iodometry) and Fluoride (colorimetry). Sewage treatment: Primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of seawater - by reverse osmosis.</p> <p><b>Polymer Technology:</b> Synthesis and properties of commercial polymers (PMMA &amp; polyurethane). Synthesis and properties of composite polymers – Kevlar. Conducting polymers – Mechanism of conduction in polyacetylene.</p>	5  3	Analyze

<p><b>Biodegradable polymers:</b> Introduction. Synthesis and properties of Poly lactic acid. Applications of biodegradable polymers in medical industry.</p> <p><b>Case study:</b> Advanced technology for industrial waste water treatment</p> <p><b>Self Study :</b> Sources of water, water analysis</p>		
<p><b>Module-5: Green Technology</b></p>		
<p><b>Pre-requisite:</b> Basic principles of green chemistry</p> <p><b>Teaching component: Green Synthesis:</b> Major environmental pollutants, Various green chemical approaches – Microwave synthesis: Introduction, working principle, differences between microwave heating and conventional heating, microwave assisted reactions.</p> <p><b>Bio catalysed reactions:</b> Defn., preparation, classification, advantages, Synthesis of typical organic compounds by conventional and green route; i) Adipic acid ii) Paracetamol iii) Ethylene oxide &amp; iv) Methyl Methacrylate.</p> <p>Synthesis of Nanoparticles (Ag &amp; Au) by using plant extracts and their applications.</p> <p><b>Case study:</b> Current Environmental issues</p> <p><b>Self Study:</b> Major environmental pollutants</p>	<p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>2</b></p>	<p style="text-align: center;"><b>Analyze</b></p>

<p style="text-align: center;"><b>Course Outcomes: After completing the course, the students will be able to</b></p>	
<p>21CHE113/123.1</p>	<p>Modify the surface properties of metals to develop resistance to corrosion, wear, abrasion and impact by corrosion control methods, electroplating and electrolessplating.</p>
<p>21CHE113/123.2</p>	<p>Construct electrochemical cells by using the principles of electrochemistry &amp; Solve energy crisis for the sustainable development of environment.</p>
<p>21CHE113/123.3</p>	<p>Illustrate certain parameters of water and replacement of conventional materials by polymers for domestic and industrial applications</p>
<p>21CHE113/123.4</p>	<p>Apply the knowledge of green Chemistry in solving environmental issues.</p>

<p><b>Reference Books</b></p>
<ol style="list-style-type: none"> <li>1. A textbook of Engineering Chemistry, S. S. Dara, 10<sup>th</sup> Edition, S Chand &amp; Co., Ltd., New Delhi, 2014</li> <li>2. Physical Chemistry, P. W. Atkins, Oxford Publications (Eighth edition-2006)</li> <li>3. Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar New Age International, 1986</li> <li>4. Green Chemistry Environmentally Benign Reactions” By V. K. Ahluwalia, Publication: Ane Books Inida, New Delhi, 2006.</li> </ol>

<b>Semester: I/II</b>		
<b>Applied Chemistry Laboratory</b>		
<b>Course Code:</b> 21CHEL116/126	<b>0:0:2:0</b>	<b>CIE Marks:</b> 50
<b>Credits:</b> 1		<b>SEE Marks:</b> 50
<b>No. of Weeks:</b> 14		<b>SEE Duration:</b> 03 Hours
<b>Course Learning Objectives: The students will be able to</b>		
To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence		

<b>List of Experiments</b>	<b>RBT Level</b>
1. Estimation of Total hardness of water by EDTA complexometric method	Apply
2. Determination of COD of wastewater sample	Apply
3. Determination of percentage of Copper in e-waste by iodometric method	Apply
4. Estimation of Iron in rust by external indicator method	Apply
5. Estimation of residual chlorine in drinking water	Apply
6. Estimation of percentage of NO <sub>2</sub> in air	Apply
7. Colorimetric estimation of fluoride in ground water	Apply
8. Determination of pKa of drug molecule using pH meter	Apply
9. Estimation of ion exchange capacity (IEC) capacity of resin Conductometrically	Apply
10. Estimation of iron in industrial effluents potentiometrically using standard K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> solution	Apply
11. Demonstration on Electrolessplating of nickel	
12. Demonstration on Detection of adulteration in food products	

<b>Course Outcomes: After completing the course, the students will be able to</b>	
21CHEL116/126.1	Handling different types of instruments for analysis of constituents present in the sample for quick and accurate results
21CHEL116/126.2	Employing the classical method for the determination of constituents present in the sample

<b>Reference Books</b>
1. Vogel's Text Book of Quantitative Chemical Analysis G. H. Jeffery, J. Bassett, J. Mendham and R.C.Denney
2. Analytical chemistry, Gary D. Christian, 6th Edition, Wiley India
3. Detect Adulteration with Rapid Test, FSSAI, Ministry of Health and Family welfare, Government of India

## Open electives

<b>Advanced Clean Fuel Technologies</b>		
<b>Course Code: 21CHE163</b>	<b>3:0:0:0</b>	<b>CIE Marks: 50</b>
<b>Credits: 1</b>		<b>SEE Marks: 50</b>
		<b>SEE Duration: 03 Hours</b>

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU

## Department of Electrical and Electronics Engineering

Semester : I / II		
Course Name: Basic Electrical Engineering		
<b>Course Code:</b> 21BEE114/124 <b>L:T:P:J:</b> 3:0:0:0	<b>CIE Marks:</b> 50	
<b>Credits:</b> 3	<b>SEE Marks:</b> 50	
<b>Hours:</b> 40	<b>SEE Duration:</b> 03 Hours	
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>❖ To explain the laws used in the analysis of DC and AC circuits.</li> <li>❖ To explain the behavior of circuit elements in single phase circuits.</li> <li>❖ To explain the generation of three phase power and operation of three phase circuits.</li> <li>❖ To explain the construction and operation of transformers, DC generators and motors, induction motors and synchronous generators.</li> <li>❖ To explain electrical safety measures.</li> </ul>		
<b>Pre-requisites:</b> NIL		
<b>Course outcomes:</b> At the end of the course the student will be able to <b>CO1:</b> Analyze basic DC circuits <b>CO2:</b> Analyze basic 1-phase and 3-phase AC electric circuits. <b>CO3:</b> Explain the working principles of transformers and electrical machines. <b>CO4:</b> Understand the working principles of protective devices and safety measures.		
Module-1: Electrical Energy Sources & DC circuits	RBT	Hrs
<b>Introduction:</b> Sources of Electrical Energy- Hydro, Thermal, Solar, Wind, Brief introduction to the electrical generation using Thermal, Solar, Hydro, Wind (Block diagram approach). <b>DC circuits:</b> Ohm's law and Kirchhoff's laws, analysis of series, parallel and series – parallel circuits excited by independent voltage sources. Power and energy, Illustrative examples	<b>Understanding Applying</b>	<b>8</b>
Module-2: Single phase and Three phase AC circuit	RBT	Hrs
<b>Single phase circuits:</b> Generation of sinusoidal voltage, frequency of generated voltage, average value, r.m.s value, form and peak factors. Voltage and current relationship, with phasor diagrams, in R, L and C circuits, Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real power, reactive power, apparent power and Power factor. Measurement of power, illustrative examples. <b>Three-phase circuits:</b> Generation of three phase power, representation of balanced star (3 wire and 4 wire system) and delta connected loads, relation between phase and line values of voltage and current from phasor diagrams, advantages of three-phase systems. Measurement of three phase power by two wattmeter method, illustrative examples	<b>Understanding Applying</b>	<b>8</b>

<b>Module–3: DC Motors and Single Phase Transformers</b>	<b>RBT</b>	<b>Hrs</b>
<p><b>DC Machines:</b> Constructional details, Working Principle, back emf and torque equations, types of motors, illustrative examples, characteristics (shunt and series only) and applications, methods of speed control of a DC shunt motor.</p> <p><b>Transformers:</b> Necessity of transformer, Working Principle, Types and construction of single phase transformers, emf equation, losses, variation of losses with respect to load, efficiency and condition for maximum efficiency, illustrative examples</p>	<b>Understanding Applying</b>	<b>8</b>
<b>Module–4: Three Phase Induction Motor and Synchronous Generators</b>	<b>RBT</b>	<b>Hrs</b>
<p><b>Three phase induction Motors:</b> Working Principle, constructional features of Induction Motor, types – squirrel cage and wound rotor, slip and illustrative examples on slip, significance of slip, applications.</p> <p><b>Three phase synchronous generators:</b> Working Principle, constructional details of salient and non-salient pole generators, synchronous speed, frequency of generated voltage, emf equation with concept of winding factor (excluding the derivation and calculation of winding factors), and illustrative examples.</p>	<b>Understanding Applying</b>	<b>8</b>
<b>Module–5: Single phase Induction motor and Electrical Safety</b>	<b>RBT</b>	<b>Hrs</b>
<p><b>Single Phase Induction Motor:</b> Introduction, Single phase motors, Types of Single phase motors: Split phase motors, Capacitor start motors, Capacitor start capacitor run motors, Performance characteristics of single phase induction motor</p> <p><b>Safety measures:</b> Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits of Fuse and MCB, Electric Shock, Safety Precautions to avoid shock, Earthing and its types,.</p>	<b>Understanding Applying</b>	<b>8</b>

<b>Semester : I / II</b>
<b>Basic Electrical Engineering Laboratory</b>
<p><b>Course objectives:</b> After studying this course, students should be able to:</p> <ul style="list-style-type: none"> <li>❖ Explain how to verify KCL and KVL for DC circuit.</li> <li>❖ Explain power and power factor measurement of different type of lamps.</li> <li>❖ Explain measurement of impedance for R-L circuits.</li> <li>❖ Explain measurement of power consumed in a 3-phase load.</li> <li>❖ Explain methods of controlling a lamp from different places.</li> <li>❖ Explain the effect of open and short circuit in simple circuits and suitability of earth resistance.</li> <li>❖ Determine performance characteristics of 1-phase induction motor and transformer</li> </ul>
<b>Pre-requisites: NIL</b>
<p><b>Course outcomes</b> At the end of the course the student will be able to:</p> <p><b>CO1:</b> verify KCL and KVL for DC circuits.</p> <p><b>CO2:</b> compare power factor of different types of lamps.</p> <p><b>CO3:</b> Demonstrate the measurement of impedance of an electrical circuit and power consumed by a 3-phase load.</p> <p><b>CO4:</b> Demonstrate two-way &amp; three-way control of lamps and domestic wiring</p> <p><b>CO5:</b> explain the effects of open and short circuits in simple circuits.</p> <p><b>CO6:</b> interpret the suitability of earth resistance measured.</p> <p><b>CO7:</b> Determine performance characteristic of 1-phase induction motor and transformer</p>

Sl. No.	Experiments
1	Verification of KCL and KVL for DC circuits
2	Performance characteristics of 1-phase IM
3	Measurement of Current, Power and Power Factor of Incandescent Lamp, Fluorescent Lamp and LED Lamp.
4	Speed control of DC Shunt motor using Armature control and Field control methods
5	Determination of efficiency of a single phase transformer by direct load test.
6	Measurement of 3 - phase Power using Two Wattmeter Method.
7	Wiring for domestic appliances and Measurement of Earth Resistance
8	Two Way and Three Way Control of Lamp and Formation of Truth Table.

**Graduate Attributes (As per NBA)**

Engineering Knowledge (PO1), Modern tool usage(PO5), The Engineer and Society (PO6)  
Individual and Teamwork (PO9), Lifelong Learning (PO12)

**Text Books**

1	Fundamentals of Electrical Engineering & Electronics	B L Theraja	S. Chand and Company Pvt. Ltd.	Reprint edition, 2013
2	Basic Electrical Engineering	D. C. Kulshreshtha	McGraw-Hill Education	1 <sup>st</sup> edition, 2019

**Reference Books**

1	Electrical Technology	E Huges	Pearson International Students	9 <sup>th</sup> edition
2	Principles of Electrical Engineering & Electronics	V K Mehta and Rohit Mehta	S. Chand and Company Pvt. Ltd.	

# *B.N.M. Institute of Technology*

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## Department of ECE

<b>Semester: I/II</b>		
<b>COURSE:</b> Basic Electronics and Communication Engineering (Integrated Lab + Mini Project)		
<b>Course Code: 21BEC114/124</b>	<b>L:T:P:J: 3:0:2:0</b>	<b>CIE Marks : 50</b>
<b>Credits:</b>	<b>4</b>	<b>SEE Marks : 50</b>
<b>Hours:</b>	<b>40 hours for Theory &amp; 14 labs</b>	<b>SEE Duration: 03 Hours</b>
<b>Pre-Requisites: Physics fundamentals</b>		
<b>Course Learning Objectives: The students will be able to</b>		
1	Understand characteristics, operations and applications of the Diode, bipolar junction transistors, and operational amplifiers in electronic circuits.	
2	Understand different number systems and working of fundamental building blocks of digital circuits.	
3	Understand the principle of basic communication system and mobile phones.	
<b>Module-1: Diodes and its Applications</b>		
<b>Teaching component:</b> Semiconductor Diode, VI Characteristics of Diode, Rectifiers - Half wave rectifier, Full wave rectifier, Bridge rectifier, Derivations of $I_{dc}$ , $I_{rms}$ , Efficiency, Ripple factor, PIV, Rectifier with C Filter, LED, Diode Clippers- series clipper, shunt clipper and double ended clippers.		<b>No. of Hrs</b>
<b>Self-study component/Case study:</b> Regulated power supply.		<b>8</b>
<b>Blooms cognitive Levels</b>		
L1,L2, L3		
<b>Module-2: Basics of Transistors and feedback concept</b>		
<b>Teaching component:</b> Bipolar Junction Transistor - DC Load line, Voltage divider biasing, BJT as an amplifier, BJT as a switch to switch ON/OFF an LED. Feedback - Concepts of feedback, Properties and advantages of Negative Feedback, Positive Feed Back: Oscillator-Barkhausen's criteria for oscillations, RC Phase Shift oscillator (Qualitative analysis Only).		<b>No. of Hrs</b>
<b>Self-study component/Case study:</b> Wein bridge Oscillator, Hartley and Colpitts Oscillator.		<b>8</b>
<b>Blooms cognitive Levels</b>		
L1,L2,L3		

<b>Module–3: Digital Electronics Fundamentals:</b>		
<b>Teaching component:</b> Difference between analog and digital signals, Number System-Decimal, Binary, Hexadecimal, Octal Conversion. Boolean algebra, Basic and Universal Gates, Simplification of SOP, Half and Full adder. Design of simple digital circuits using Gates (2-variable / 3-variable problems)	<b>No. of Hrs</b>  <b>8</b>	<b>Blooms cognitive Levels</b>  L1,L2,L3
<b>Self-study component/Case study:</b> Multiplexer and Encoders		
<b>Module–4: Op-Amp fundamentals and Linear IC</b>		
<b>Teaching component:</b> Introduction to Op-Amp, Op-Amp Input Modes, Virtual ground and Virtual short concept, Op-Amp Parameters-CMRR. Input Offset Voltage and Current, Input Bias Current, Input and Output Impedance, Slew Rate. Applications of Op- Amp: Inverting amplifier, Non-Inverting amplifier, Summer, Voltage follower, Integrator, Differentiator and Comparator.	<b>No. of Hrs</b>  <b>8</b>	<b>Blooms cognitive Levels</b>  L1,L2,L3
<b>Self-study component/Case study:</b> $\mu$ A 741 op-amp data sheet		
<b>Module–5: Fundamentals of Communications</b>		
Block diagram approach to explain Basic Communication system. Modulation - need for modulation, AM, FM. Equations of AM and FM. Comparison of AM and FM. Frequency ranges for communication.	<b>No. of Hrs</b>  <b>8</b>	<b>Blooms cognitive Levels</b>  L1,L2,L3
<b>Self-study component/Case study:</b> Principle of operations of Mobile phone (Block Diagram Approach)		

<b>Lab Experiments</b>	
<b>Sl. No</b>	<b>Experiments</b>
<b>1</b>	HWR and FWR with and without filter
<b>2</b>	Hartley and Colpitts Oscillators
<b>3</b>	To switch on/off an LED using a Diode and transistor
<b>4</b>	Diode Clipper: Series, Shunt and Double ended
<b>5</b>	a. Simulation of Analog circuits using Multisim Online Tool (Transistor, Op-amp applications) b. Simulation of Digital circuits using Multisim Online Tool (Gates, Universal gates, Half adder and full adder)
<b>6</b>	Design a half adder and full adder using Digital kit
<b>7</b>	Design of Adder and Subtractor using Op-amp
<b>8</b>	Design of Differentiator and Integrator using op-amp
<b>9</b>	AM and FM demonstration
<b>Mini Project</b>	
<b>One Mini project to be completed in 3 lab sessions</b>	

<b>Course Outcomes: After completing the course, the students will be able to</b>	
<b>21BEC114/124.1</b>	Apply the usage of diodes for varieties of applications.
<b>21BEC114/124.2</b>	Design oscillators and amplifiers using BJT and feedback networks.
<b>21BEC114/124.3</b>	Develop circuits using operational Amplifiers and verify using simulation tool
<b>21BEC114/124.4</b>	Construct simple combinational circuits using the concepts of number systems and gates and verify using simulation tool
<b>21BEC114/124.5</b>	Describe the basic principle of operation of communication system and mobile phones.

<b>Reference Books</b>
1. Electronic Devices and Circuits, David A. Bell, Oxford University Press.
<b>Text Books</b>
1. Electronic Devices, Thomas L. Floyd, Pearson Education.
2. Electronic Devices & Circuit Theory, Boylestad & Nashelsky, Pearson Education

### CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3										2	3	
CO2	3	3	3									2	3	
CO3	3	3	3		3							2	3	2
CO4	3	3	3		3							2	3	2
CO5	3	2				3						2	2	

# *B.N.M. Institute of Technology*

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## Department of Mechanical Engineering

<b>Course Name</b>	<b>Basic Engineering Sciences</b>	<b>Credits</b>	<b>03</b>
<b>Course code</b>	<b>21BES115/125</b>	<b>CIE</b>	<b>50</b>
<b>Number of Lecture Hours/Week</b>	<b>2L+2T</b>	<b>SEE</b>	<b>50</b>
<b>Total Number of Lecture Hours</b>	<b>40</b>	<b>Exam Hours</b>	<b>3 hours</b>
<b>Course Objective :</b> This course will enable the students <ol style="list-style-type: none"><li>1. To Learn the fundamental concepts of Energy Sources, Design Process and Mechanical Drives</li><li>2. To enumerate the knowledge of working with CNC machine tools, Automation and Robotics.</li><li>3. To distinguish different joining process and learn the basics of Additive Manufacturing</li><li>4. To learn the scope of various fields of Civil Engineering, Types of Bridges, Dams, Roads and Advancement in Civil Engineering.</li><li>5. To learn the importance of other branches of Engineering in Civil Construction.</li></ol>			
<b><u>Pre-requisite:</u></b> Fundamental of Physics, Mathematics, Basics of 2D Drawing and Dimensioning, Basic of Electronic equipment and Programming skills, Basics Concept of Materials, 3D Visualization and knowledge of different types of infrastructure.			
<b>Module-I: Energy Sources-Design Process-Mechanical Drives</b>			
<b><u>Teaching component:</u></b> <b>Energy sources:</b> Review of Energy Sources, Wind Energy, Wind energy conversion devices, Tidal Energy, Wave Energy Conversion Devices, Solar Thermal Energy Conversion. <b>Mechanical Drive Systems</b> <b>Belt Drives:</b> Components of belt drive, Types of belt drives, Concept of velocity ratio and belt tensions, Flat belt drive-Derivation of length of belt for open and crossed belt drive, Numerical problems on velocity ratio & power calculation, Application of belt drives. <b>Gear Drives:</b> Types of gears, Gear terminology, Velocity ratio, Gear train - Concept of simple, compound, epicyclic, inverted and differential gear trains, Numerical problems on simple and compound gear trains. <b><u>Self-study component/Case study:</u></b>		<b>8Hrs</b>	<b>Apply</b>

Study on different types of drives in automobiles, a case study in Solar photovoltaics.		
<b>Module-2: Machine Tools, CNC Machines and Robotics</b>		
<p><b><u>Teaching component:</u></b></p> <p><b>Machine tools:</b> Fundamentals of Machining and machine tools, Working Principle of Lathe, Various Lathe Operations: Turning, Facing, Thread Cutting, Drilling Taper Turning and Knurling. Specification of Lathe. Construction and Working of Milling Machines, Various Milling Operations.</p> <p><b>CNC Machines-</b>Introduction, components of CNC, advantages and applications of CNC, CNC Machining centers and Turning Centers, Basic Part Programming of Turning Operations for CNC Machines.</p> <p><b>Robotics:</b>Robot anatomy, Joints and Links, physical configuration of Robot, Accuracy and Repeatability, End effectors, Sensors and Actuators used in Robot.</p> <p><b><u>Self-study component/Case study:</u></b> Basic Part Programming of Milling Operations for CNC Machines. Evaluation of the Automation of Material Handling with Mobile Robots.</p>	<b>8Hrs</b>	<b>Apply</b>
<b>Module-3: Manufacturing Process Additive Manufacturing and Automation</b>		
<p><b><u>Teaching component:</u></b></p> <p><b>Manufacturing Process:</b> Steps involved in Casting ,Casting Defects, Principles of Electric Arc Welding, TIG&amp;, MIG Welding and Brazing</p> <p><b>Additive manufacturing (AM):</b> Steps involved in AM, Stereo lithography, FDM, Metal Jet and Binder Jet Process.</p> <p><b>Automation:</b> Elements of automated systems&amp; types of Automated systems,</p> <p><b><u>Self-study component/Case study:</u></b> Role of additive manufacturing in medical application</p>	<b>8Hrs</b>	<b>Apply</b>
<b>Module-4: Basics of Civil Engineering</b>		
<p><b><u>Teaching component:</u></b></p> <p><b>Scope of different fields of Civil Engineering:</b> Surveying, Building materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Transportation Engineering, Hydraulics, Environmental Engineering, Architecture and Town planning.</p> <p>Application: Application of Artificial intelligence in Civil Engineering, Electronic Distance measuring Devices(EDM), Geographic Information system (GIS) and Remote sensing.</p> <p><b>Innovative materials and Practices in Construction Technology:</b> Pre-Engineered Buildings (PEB'S), Manufactured Sand, Cement replacement materials.</p>	<b>8Hrs</b>	<b>Apply</b>

<p><b>Analysis of force systems:</b> Resultant of concurrent coplanar force system, coplanar non-concurrent force system</p> <p><b>Self-study component/Case study:</b></p> <p>Prepare single line plan of residential building.</p>		
<b>Module-5: Engineering Mechanics</b>		
<p><b>Teaching component:</b></p> <p><b>Equilibrium of force systems:</b> equilibrium of concurrent and non-concurrent coplanar force system</p> <p><b>Support reactions:</b> Types of loads and types of supports, statically determinate and indeterminate beams, support reactions in beams, Numerical problems on support reactions for statically determinate beams</p> <p><b>Centroid and Moment of Inertia:</b> Introduction, locating the centroid of simple figures from first principle, the centroid of composite and built-up sections. Moment of inertia of composite area and built-up sections</p> <p><b>Self-study component/Case study:</b></p> <p>Prepare single line parking plan for commercial buildings.</p>	<b>8Hrs</b>	<b>Apply</b>
<b>Total</b>		<b>40 Hrs</b>

<b>Course Outcomes: After completing the course, the students will be able to</b>	
21BES115.1	Explain the Design Process, methods of Energy conversion and Mechanical drive system for engineering applications
21BES115.2	Apply the knowledge of manufacturing process & additive manufacturing principles in various engineering applications
21BES115.3	Explain different types of CNC machine tools, Automation and their applications in performing various machining operations and robots in automated production systems.
21BES115.4	Understand the scope of different branches of Civil Engineering, its applications in other fields of Engineering
21BES115.5	Understand different types of Bridges, Dams, Roads & use of Advance Technology and Materials in Civil Construction
21BES115.6	Evaluate mechanical and civil engineering applications and technologies

<b>Text Books</b>
1. K.R.Gopalkrishna, "A text Book of Elements of Mechanical Engineering"- Subhash Publishers, Bangalore

2. Mechanics for Engineers: Statics by Ferdinand P. Beer and E. Russet Johnston Jr., McGraw-Hill Book Company, New York.
3. Engineering Mechanics by K.L. Kumar, Tata McGraw-Hill Publishing Company, New Delhi.
4. Elements of Civil Engineering by Jagadeesh T.R. and Jayaram, Sapna Book House, Bangalore.
5. Elements of Civil Engineering (IV Edition) by S.S. Bhavikatti, Vikas Publishing House Pvt. Ltd., New Delhi.

#### Reference Books

1. Elements of Mechanical Engineering by K.P Roy S.K Hajra and Choudhary, Nirjhar Choudhary, Media Promoters and Publishers Pvt Ltd
2. Product Design and Development by Karl T. Ulrich, Steven D. Eppinger.
3. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi.
4. Additive Manufacturing Technologies, Ian Gibson, David Rosen, Brent Stucker, Second Edition, Springer Publication
5. Automation, Production Systems & CIM, Mikell P.Groover, PHI.
6. Elements of Civil Engineering by Jagadeesh T.R. and Jayaram, Sapna Book House, Bangalore.
7. M.N. Shesha Prakashand Ganesh B.Mogaveer “Elements of Civil Engineering and Engineering Mechanics” PHI Learning

#### CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	2	2	-	-	-	-	2
CO2	3	3	-	-	2	-	2	-	-	-	-	-
CO3	3	-	-	-	2	-	-	-	-	-	-	2
CO4	3	2	-	2	2	-	2	-	-	-	-	-
CO5	3	2	-	2	2	-	2	-	-	-	-	-
CO6	3	2	-	2	2	3	2	-	-	-	-	2

# *B.N.M. Institute of Technology*

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## Department of Mechanical Engineering

Course Name	Engineering Graphics & Design	Credits	02
Course code	21EGD115/125	CIE	50
Number of Lecture Hours/Week	2L+2P	SEE	50
Total Number of Lecture Hours	40	Exam Hours	3 hours

### Course Objective :

This course will enable the students

1. To create awareness and emphasize the need for Engineering Graphics
2. To follow basic drawing standards and conventions
3. To understand the concepts of orthographic and isometric projections
4. To use the techniques, skills, and modern engineering tools necessary for engineering practice
5. To use the CAD software for creating 2-D and 3-D Models for engineering applications

**Pre-requisite:** Basics Geometrical constructions, orientation of straight lines, Conic sections, reading of 2D Drawing and Visualization of 3D Object, Computer skills and knowledge of material properties.

### Module-I: Drawing Standards, Conic Sections , Orthographic Projections & CAD soft ware

#### Teaching component:

**Introduction:** Principles of Engineering Graphics and their significance, usage of Drawing Instruments, Lettering, Dimensioning, Conic sections including the Parabola, Hyperbola, Cycloid, Epicycloids, Hypocycloid and Involutives.

**Orthographic Projections of points:** Introduction to Orthographic projections, Orthographic projections of points in all the quadrants.

**Introduction to CAD soft ware (Solid edge):** Coordinate system and reference plane HP, VP, RPP and LPP of 2D and 3D environment. Commands and its application.

6Hrs

Apply

#### Self-study component/Case study:

Construction of different types of scales, line conventions and material conventions		
<b>Module-2: Projections of Straight Lines and Plane Surfaces</b>		
<p><b><u>Teaching component:</u></b></p> <p><b>Projections of Straight Lines:</b> Line inclined to both HP &amp; VP with respect to first quadrant only.</p> <p><b>Projection of Planes:</b> Orthographic projection of plane surfaces like triangle, square, pentagon, hexagon, rectangle and circular surfaces. Planes can be resting on HP/VP/PP and inclined to HP/VP. Planes in different position by using change of position method only.</p> <p style="text-align: center;"><b><u>Self-study component/Case study:</u></b></p> <p>Application problems on projection of lines and plane surfaces</p>	<b>8Hrs</b>	<b>Apply</b>
<b>Module-3: Projections of Solids</b>		
<p><b><u>Teaching component:</u></b></p> <p><b>Projections of Right regular solids:</b> Introduction, Prisms and pyramids (Triangle, square, rectangle, pentagon, and hexagon), cones, cube and tetrahedron with axis inclined to both HP and VP. ( Solid resting on HP only)</p> <p style="text-align: center;"><b><u>Self-study component/Case study:</u></b></p> <p>Freely suspended solids with the axis isinclined to both HP and VP</p>	<b>8Hrs</b>	<b>Apply</b>
<b>Module-4: Development of Surfaces and Isometric Projections</b>		
<p><b><u>Teaching component:</u></b></p> <p><b>Development of lateral Surfaces of solids:</b> Introduction to section of solids and sectional views. Development of solids like Prisms, Cylinder, Pyramids and Cones resting with base on HP only.</p> <p><b>Isometric Projections:</b> Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric projection of simple plane figures, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids. Conversion of Isometric Views to Orthographic Views and Vice-versa.</p> <p><b><u>Self-study component/Case study:</u></b></p> <p>Truncated and frustums of solids, Application problems like Funnel, Tray and Transition pieces connecting two ducts. Isometric projections and views of simple solids and truncated solids in simple position</p>	<b>8Hrs</b>	<b>Apply</b>

<b>Module – 5 : Computer Aided Drafting &amp; Design</b>		
<b>Teaching component:</b>  <b>Computer Aided Design (CAD)</b> software modeling of parts and assemblies. Use of solid-modeling software for creating associative models at the component and assembly levels; Basic building drawing- floor plans that include: windows, doors, and fixtures. Electronic drawing – PCB drawing. <b>Self-study component/Case study:</b> Introduction to Building Information Modeling (BIM)	<b>10Hrs</b>	<b>Apply</b>
<b>Total</b>	<b>40 Hrs</b>	

<b>Course Outcomes: After completing the course, the students will be able to</b>	
21EGD115.1	Demonstrate the usage of drawing instruments, dimensioning principles, conventions as per BIS standards
21EGD115.2	Apply the principles of orthographic projections to draw projections of points, lines, planes and solids
21EGD115.3	Construct geometries of planes and solids using principles of isometric projections
21EGD115.4	Prepare the Development of lateral surfaces of the given solid by applying the concepts of sections of solids and conversions of 3D view to orthographic views
21EGD115.5	Demonstrate the usage of CAD software for 2D drawings and 3D modeling
21EGD115.6	Create 2-D drawing and 3-D models for Mechanical and Civil engineering applications

<b>TextBooks</b>
<ol style="list-style-type: none"> <li>1. Luzadder Warren J., Duff John M., “Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production”, Eastern Economy Edition, Prentice-Hall of India Pvt. Ltd., New Delhi.</li> <li>2. K.R. Gopalakrishna, “Computer Aided engineering Drawing”, Subash Publishers Bangalore</li> <li>3. SOLIDWORKS 2021 Reference Guide Published April 6, 2021 By David C.SDC Publications.</li> <li>4. N.D.Bhatt&amp;V.M.Panchal, “Engineering Drawing”, 48th edition, 2005- Charotar Publishing House, Gujarat.</li> <li>5. S.Trymbaka Murthy, “Computer Aided Engineering Drawing”, Universities Press(India) Pvt. Ltd., Hyderabad, 4<sup>th</sup> Edition.</li> </ol>



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I/II Semester

<b>INNOVATION AND DESIGN THINKING</b>			
Course Code:	<b>21HDT117</b>	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0:2:0:0	SEE Marks	50
Total Hours of Pedagogy	1	Total Marks	50
Credits	01	Exam Hours	01
<b>Course Category:</b> Foundation			
<b>Preamble:</b> This course provides an introduction to the basic concepts and techniques of engineering and reverse engineering, process of design, analytical thinking and ideas, basics and development of creative ways of thinking of every problem the students face in their life,.			
<b>Course objectives:</b>			
1.To explain the concept of design thinking for product and service development			
2.To explain the fundamental concept of innovation and design thinking			
3. To discuss the methods of implementing design thinking in the real world.			
<b>Pedagogy (General Instructions)</b>			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.			
1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.			
2. Show Video/animation films to explain concepts			
3. Encourage collaborative (Group Learning) Learning in the class			
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking			
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.			
6. Topics will be introduced in a multiple representation.			
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.			
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.			
<b>Module-1( 3 hours)</b>			
<b>Empathy For Design Thinking</b>			
Why Empathy?, How to?, The power of Storytelling in Empathy, Mini workshops to establish Empathy			
<b>Pedagogy</b>	<ul style="list-style-type: none"><li>• <b>Introduction about the design thinking particularly Empathy : Presentation mode</b></li><li>• <b>Workshop mode</b></li></ul>		
<b>Module-2(3 Hours)</b>			

<b>Define for Design Thinking</b> Analysis & Synthesis, Empathy Mapping, Problem Statement, How might We?, Real Time interactions, Collaborated enabled design thinking		
<b>Pedagogy</b>	Case studies on design thinking for real-time interaction and analysis Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking	
<b>Module-3 (3 Hours)</b>		
<b>Ideate for Design Thinking</b>		
<b>Pedagogy</b>	Case studies on design thinking and business acceptance of the design	
<b>Module-4(3 Hours)</b>		
<b>Prototype for Design Thinking</b> Types of Prototyping , Guidelines of prototyping, Rapid prototyping, Scenario based Prototyping, MVP Prototyping Mini Workshops/Presentations/Video Case studie		
<b>Pedagogy</b>	Business model examples of successful designs Simulation on the role of virtual eco-system for collaborated prototyping MVP and Prototyping through live examples and videos	
<b>Module-5( 3 Hours)</b>		
<b>Testing</b> Compare Alternatives, Users experience, Observe, Follow ups Popular Design Frameworks		
<b>Pedagogy</b>	4 hours design thinking workshop cum competition. Live project on design thinking in a group of 4 students	
<b>Course Outcomes:</b> Upon the successful completion of the course, students will be able to:		
<b>CO Nos.</b>	<b>Course Outcomes</b>	<b>Knowledge Level(RBT)</b>
CO1	Appreciate various design process procedure	K2
CO2	Generate and develop design ideas through different technique	K2
CO3	Identify the significance of reverse Engineering to Understand products	K2
CO4	Experience design thinking process in real	K3
<b>Assessment Details (both CIE and SEE)</b> (Methods of CIE need to be define topic wise i.e.- MCQ, Quizzes, Open book test, Seminar or micro project) The weightage of Continuous Internal Evaluation (CIE) is 100%		
<b>Continuous Internal Evaluation:</b> 1. Methods suggested: Test, Open Book test, Written Quiz, Seminar, report writing etc. 2. The class teacher has to decide the topic for MCQs, closed book test, open book test, Written Quiz, Live Project and Seminar. In the beginning only teacher has to announce the methods of CIE for the subject.		
Introduction of Ideation - Create Thinking - Generating Design Ideas - Lateral Thinking – Analogies –Brainstorming - Mind mapping - Synectics - Analytical Thinking - Group Activities		

Recommended

### Suggested Learning Resources:

#### Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

#### References:

5. Yousef Haik and Tamer M. Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
6. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

#### Web links and Video Lectures (e-Resources):

1. [www.tutor2u.net/business/presentations/. /productlifecycle/default.html](http://www.tutor2u.net/business/presentations/. /productlifecycle/default.html)
2. [https://docs.oracle.com/cd/E11108\\_02/otn/pdf/. /E11087\\_01.pdf](https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf)
3. [www.bizfilings.com](http://www.bizfilings.com) › Home › Marketing › Product Development
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit>
6. [www.vertabelo.com/blog/documentation/reverse-engineering](http://www.vertabelo.com/blog/documentation/reverse-engineering)  
<https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>
8. <https://www.youtube.com/watch?v=2mjSDIBaUIM> [thevirtualinstructor.com/foreshortening.html](http://thevirtualinstructor.com/foreshortening.html)  
<https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>  
<https://dschool.stanford.edu/use-our-methods/> 6. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process> 7. <http://www.creativityatwork.com/design-thinking-strategy-for-innovation/> 49
9. 8. <https://www.nngroup.com/articles/design-thinking/> 9. <https://designthinkingforeducators.com/design-thinking/> 10. [www.designthinkingformobility.org/wp-content/.../10/NapkinPitch\\_Worksheet.pdf](http://www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf)  
<https://dschool.stanford.edu/groups/k12/wiki/c0be1/Prototype.html>  
<https://www.nngroup.com/articles/ideation-in-practice/>  
<https://www.interaction-design.org/courses/design>

#### Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- <http://dschool.stanford.edu/dgift/>

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**Department of Humanities**

**Professional English Communication**

**Year: 2021-22**

Course Code	21ECS117	CIE Marks	50
Teaching Hours / Week	(L:1 T: P: 2)	SEE Marks	50
Credits	02	Exam Hours	01
Total no. of hours	25		
		<b>Hrs</b>	<b>RBT</b>
<b>Module-1: Introduction to Communicative English</b>		<b>5hrs</b>	<b>Understand</b>
<p><b>Pre-requisite:</b> Basics of Grammar learnt in PUC –Parts of Speech.</p> <p><b>Teaching component:</b> Fundamentals of Communicative English-Difference between General English and Technical English; Process of Communication, Types of communication: Verbal and Non-Verbal Communication, Barriers in Communication, Interpersonal Communication, and how to improve it,</p> <p><b>Grammar Focus:</b> Parts of Speech Revision - Identify the parts of speech in a given text</p> <p><b>Activity:</b> Paired Activity to ignite Conversation; Students interact with each other and work in pairs; talk about their Special Skill, Hobbies, and Passion. Self-study</p>			
<b>Module-2: Listening Skills</b>		<b>5 hrs</b>	<b>Apply</b>
<p><b>Pre-requisite:</b> Basics of Grammar learnt in PUC –Parts of Speech, Use of Articles, Sounds of Vowels and Consonants.</p> <p><b>Teaching component:</b> Basics of Phonetics, Sounds and Symbols of Vowels, Consonants, Diphthongs, Silent and non-silent letters, The and Thee, Homophones, Homonyms, Paralinguistics, Difference between Hearing and Listening</p> <p>Self-study: Audio Track: Listening Comprehension</p> <p><b>Activity:</b> Role play</p>			
<b>Module-3: Speaking Skills</b>		<b>5 hrs</b>	<b>Apply</b>
<p><b>Pre-requisite:</b> Basics of Grammar learnt in PUC –Parts of Speech, Punctuations, Speaking on given topics</p> <p><b>Teaching component:</b> Paraphrasing conversations, Mother Tongue Influence, Accent Neutralization, Common Errors in Pronunciation, Group Discussion: Significance of Group discussion, Do's and Don'ts</p> <p><b>Activity:</b> GD</p>			
<b>Module-4: Reading Skills</b>		<b>5 hrs</b>	<b>Apply</b>
<p><b>Pre-requisite:</b> Language learnt at PUC level</p> <p><b>Teaching component:</b> Reading comprehension, Ethical Communication Grammar focus; Use of Active Verbs, Tenses, Subject Verb Agreement,</p> <p><b>Self-study Activity:</b> Book review, newspaper article reading</p>			

<b>Module-5: Writing</b>	<b>5 hrs</b>	<b>Apply</b>
<b>Pre-requisite:</b> Basics of Grammar learnt in PUC –Parts of Speech, <b>Teaching component:</b> Techniques of Paragraph Writing, Report writing- Long reports and Short reports; Email etiquette, Formal Letter writing; <b>Activity:</b> Students write a short paragraph and a Report, Comprehension on topics given with a focus on punctuation-Use of Full stop, Comma, Capital letters, Semicolon and Colon and Hyphen.		
<b>Question paper pattern:</b> <ul style="list-style-type: none"> <li>  The Question paper will have 100 objective questions.</li> <li>  Each question will be for 01marks</li> <li>  Student will have to answer all the questions in an OMR Sheet.</li> <li>  The Duration of Exam will be 3hours.</li> </ul>		

**Course Outcomes:**

**At the end of the course, the learner will be able to:**

<b>CO 1</b>	Understand the fundamentals of English communication and the difference between technical and general English
<b>CO2</b>	Understand the principles of listening and apply phonetics in speaking to others
<b>CO3</b>	Identify the MTI and neutralise it while speaking in various situations
<b>CO4</b>	Analyse the given content, understand the context and respond in an ethical and appropriate manner
<b>CO5</b>	Apply the techniques of professional writing like letters, emails and reports.

<b>Reference Books</b>
<ul style="list-style-type: none"> <li>i. English for Technical Communication by N P Sudarshana and C. Savitha, Cambridge University Press</li> <li>ii. Business Benchmark-Cambridge BEC</li> <li>iii. Cengage: Technical English I/II by Rajesh Kumar , L Thimmesha, S Venkateswaran</li> <li>iv. Technical Communication by Dr. Meenakshi Raman, Dr. Sangeeta Sharma, Dr. Sanjay Kumar, DLPD, BITS Pilani</li> <li>v. Effective Technical Communication- A guide for Scientists and Engineers by Barun K Mitra, Oxford University Press</li> <li>vi. Indexing: A Nuts and Bolts Guide for Technical Writers by Kurt Ament, William Andrew publishing</li> </ul>
<b>Text Books</b>
<ul style="list-style-type: none"> <li>1. Technical English I and II by Dr Ravindranath Tiwari</li> <li>2. Excellence in Communication Skills by Dr Shashi Prabha</li> </ul>



**B.N.M. Institute of Technology**  
**An Autonomous Institution under VTU**  
**Department of Humanities**

**Liberal Arts Year 2021-22**

Sl. No.	Course and Course code	Course Title	Teaching Hours/week				Examination			Credits
			Theory Lecture	Tutorial	Practical/ Training	Project	CIE	SEE	Total	
			L	T	P	J				
1	21LCA118-1	Music Production	0		2		100	-	100	01
<b>Course Name</b>		<b>Music Production</b>	<b>Credits</b>			<b>01</b>				
<b>Course Code</b>		<b>21LCA118-1</b>	<b>CIE Marks</b>			<b>50</b>				
<b>Number of Lecture Hours/Week</b>		<b>2</b>	<b>SEE Marks</b>			<b>50</b>				
<b>Total Number of Lecture Hours</b>		<b>26</b>	<b>Exam Hours</b>			<b>01</b>				
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>❖ To learn music theory</li> <li>❖ To read and write staff notation</li> <li>❖ To do MIDI Programming</li> <li>❖ To learn editing using software</li> <li>❖ To Compose Rhythms and Programming Rhythms</li> <li>❖ To learn sound engineering</li> </ul> To learn sound mixing and mastering										
<b>Pre-requisites:</b> Basics of singing or any instruments. Laptop										
<b>Course Outcomes:</b> <ul style="list-style-type: none"> <li>❖ After studying this course, students will be able to:</li> <li>❖ Understand the Staff Notation</li> <li>❖ Compose Music independently</li> <li>❖ Edit and Mix the tracks.</li> <li>❖ Program the Rhythms and beats</li> </ul>										
<b>Module-1:</b>								<b>10 hrs</b>	<b>Apply</b>	
Music Theory and Practice, Staff notation reading, writing. singer exercise, Keyboard interface, Midi programming, Melody composition, Instrument arrangements.										
<b>Module-2:</b>								<b>10 hrs</b>	<b>Apply</b>	
Software tools for music composition (Ex: Pro tool) Midi Editing, audio recording and editing, Rhythm/drums/Indian beats programming.										
<b>Module-3:</b>								<b>6 hrs</b>	<b>Apply</b>	
Synthesizer, sampling and sound engineering. Oscillators, filters, EQ, compressor, reverbs, Mixing and mastering.										
<b>Graduate Attributes (As per NBA)</b> <ul style="list-style-type: none"> <li>• Modern tool usage(PO5)</li> <li>• The Engineer and Society (PO6)</li> <li>• Individual and Team Work (PO9)</li> </ul> Lifelong Learning (PO12)										
<b>Instructor</b>										
1	<b>Mr. Umesh/Vishak</b>							<b>Free lancer</b>		

Sl. No.	Course and Course code	Course Title	Teaching Hours/week				Examination			Credits
			Theory Lecture	Tutorial	Practical/ Training	Project	CIE	SEE	Total	
			L	T	P	J				
1	21LCA118-2	Choreography-Dance Production	0		2		100	-	100	01
<b>Course Name</b>		Dance Production		<b>Credits</b>			<b>01</b>			
<b>Course Code</b>		21LCA118-2		<b>CIE Marks</b>			<b>50</b>			
<b>Number of Lecture Hours/Week</b>		2		<b>SEE Marks</b>			<b>50</b>			
<b>Total Number of Lecture Hours</b>		26		<b>Exam Hours</b>			<b>01</b>			
<b>Course Objectives:</b>										
<ul style="list-style-type: none"> <li>❖ To learn Dance theory</li> <li>❖ To know the history of Indian Dance Style</li> <li>❖ To learn other forms of Indian Dance</li> <li>❖ To know free style and contemporary dance form</li> <li>❖ To learn basics of Costume and Makeup</li> <li>❖ To learn the concept of lighting for dance</li> <li>❖ To choreograph dance</li> </ul>										
<b>Pre-requisites:</b> Basics of Dance.										
<b>Course Outcomes:</b>										
<ul style="list-style-type: none"> <li>❖ After studying this course, students will be able to:</li> <li>❖ Understand the history of Dance</li> <li>❖ Compose dance for the given style</li> <li>❖ Emote the expressions (Navarasa through Dance)</li> <li>❖ Choreograph / Produce the dance</li> </ul>										
<b>Module-1:</b>										
History of Indian Dance, Free style and contemporary dance, primary experiences of creative thought processes, movement invention, creation, and composition; --creation of phrases; --initial development of vision and values; --beginnings of overall compositional form within the making of solos.							10 hrs	Apply		
<b>Module-2:</b>										
Create a light design, find or create music or sound, decisions regarding set, take decisions regarding costume or fashion. Duet, Trio and Group Dance composition.							6 hrs	Apply		
<b>Module-3:</b>										
Concept of emotion. Study of different kinds and styles of emotion. Practicing the techniques and skills in emotion including dance and movement. Analysis and preparation for building a character. Process of preparation of dancer. Understanding what Choreography, Concept and principles of Choreography is. Understanding the process of Choreography for various styles and forms. Dance Production.							10 hrs	Apply		
<b>Graduate Attributes (As per NBA)</b>										
<ul style="list-style-type: none"> <li>• Modern tool usage(PO5)</li> <li>• The Engineer and Society (PO6)</li> <li>• Individual and Team Work (PO9)</li> <li>• Lifelong Learning (PO12)</li> </ul>										
<b>Instructor</b>										
1	Mrs. Rukmini Vijaykumar (ref)				Free lancer					

Sl. No.	Course and Course code		Course Title	Teaching Hours/week				Examination			Credits
				Theory Lecture	Tutorial	Practical/ Training	Project	CIE	SEE	Total	
				L	T	P	J				
1		21LCA118-3	Theatre Arts	0		2		100	-	100	01
<b>Course Name</b>			<b>Theatre Arts</b>	<b>Credits</b>			<b>1</b>				
<b>Course Code</b>			<b>21LCA118-3</b>	<b>CIE Marks</b>			<b>50</b>				
<b>Number of Lecture Hours/Week</b>			<b>2</b>	<b>SEE Marks</b>			<b>50</b>				
<b>Total Number of Lecture Hours</b>			<b>26</b>	<b>Exam Hours</b>			<b>01</b>				
<p><b>Course Objectives:</b> This course will enable the students to,</p> <ul style="list-style-type: none"> <li>❖ Learn different origins and history of theatre.</li> <li>❖ Understand the techniques of voice culturing.</li> <li>❖ Understand the concept and Principles in set design, Lighting, costume design and make-up.</li> <li>❖ Understand different kinds and styles of acting and Process of building a character.</li> <li>❖ Understand the Concept, principles of direction and the process of directing plays.</li> </ul>											
<b>Pre-requisites: NIL</b>											
<p><b>Course Outcomes:</b> After studying this course, students will be able to:</p> <ul style="list-style-type: none"> <li>❖ Analyze and apply the knowledge of theater history and voice modulation techniques in stage performances.</li> <li>❖ Apply the concept and Principles of set design, Lighting, costume design and make-up in performances.</li> <li>❖ Apply the concepts of various techniques and styles of acting to build a character.</li> <li>❖ Understand and interpret the process of writing and directing a play.</li> </ul>											
<b>Module-1: Theatre History &amp; Voice Culturing</b>											
<p><b>Theatre History :</b> A Glance at Origin of theatre history &amp; development of theatre. Introduction to theatre traditions and forms including world theatre, Asian theatre Classic and Modern Indian Theatre and Folk Theatre.</p> <p><b>Voice Culturing:</b> Understanding the insights of voice culturing. Introduction to the techniques of voice training. Understanding the word and process of pronunciation. Process of speech and problems in speech. Practicing various methods of effective speech. Designing effective process of speech for performing on stage.</p>								<b>10 hrs</b>		<b>Apply</b>	
<b>Module-2: Stage Craft &amp; Theatre Technique</b>											
<p><b>Set and Costume Design :</b> Basic concept, Principles and methods of scenic design. Stage technique and set construction. Designing set models and set execution. Study of elements and principals of costume design such as Color schemes, textures, shapes etc. Process of designing costumes for various styles of play and their execution.</p> <p><b>Lighting and Make-Up:</b> Study of concept of stage lighting, Functions and principles of lighting. Understanding the process of light designing, study of special effects in light designing. Execution of light for plays.</p>								<b>6 hrs</b>		<b>Apply</b>	
<b>Module-3: Acting &amp; Direction</b>											
<p><b>Acting:</b> Concept of acting. Study of different kinds and styles of acting. Practicing the techniques and skills in acting including dance and movement. Analysis and preparation for building a character. Process of preparation of an actor.</p> <p><b>Direction and Play Writing:</b> Understanding what is direction, Qualities of a director and Importance of a director in play production. Concept and principles of direction. Understanding the process of directing plays for various styles and forms. Introduction to various types and styles of play writing. Understanding the process of play writing and execution.</p>								<b>10 hrs</b>		<b>Apply</b>	
<p><b>Graduate Attributes (As per NBA)</b></p> <ul style="list-style-type: none"> <li>• Modern tool usage(PO5)</li> <li>• The Engineer and Society (PO6)</li> <li>• Individual and Team Work (PO9)</li> <li>• Lifelong Learning (PO12)</li> </ul>											
<b>Instructor</b>											
1			<b>Mr. Joseph Neenasam</b>				<b>Free lancer</b>				

Sl. No.	Course and Course code		Course Title	Teaching Hours/week				Examination			Credits
				Theory Lecture	Tutorial	Practical /	Project	CIE	SEE	Total	
				L	T	P	J				
1	Fine Arts	21LCA118-4	FINE ARTS	0		2		100	-	100	1
<b>Course Name</b>			<b>Fine Arts</b>	<b>Credits</b>			<b>01</b>				
<b>Course Code</b>			<b>21LCA118-4</b>	<b>CIE Marks</b>			<b>50</b>				
<b>Number of Lecture Hours/Week</b>			<b>2</b>	<b>SEE Marks</b>			<b>50</b>				
<b>Total Number of Lecture Hours</b>			<b>26</b>	<b>Exam Hours</b>			<b>01</b>				
<b>Course Objectives:</b>											
<ul style="list-style-type: none"> <li>❖ Acquire basic foundation skills in fine arts</li> <li>❖ Working Knowledge on the art forms of drawing &amp; painting</li> <li>❖ Demonstrate the process and model of sculpt art</li> <li>❖ Apply knowledge in the field of communication media</li> </ul>											
<b>Pre-requisites:</b>											
<ul style="list-style-type: none"> <li>❖ Interest in the creative process of developing a content applicable to the visual life and society</li> </ul>											
<b>Course Outcomes:</b> After studying this course, students will be able to:											
<ul style="list-style-type: none"> <li>❖ Apply basic understanding of coloring, drawing and painting and ability to apply them to a specific aesthetic content.</li> <li>❖ Apply Knowledge and skills in the use of basic tools, techniques, and processes to work from concept to finished product.</li> <li>❖ Clearly communicate the content, context, and process of their applied art visually, orally and in writing.</li> </ul>											
<b>Module-1: Drawing &amp; Painting</b>											
Abstraction and Stylization, Foreshortening, perspective, eyelevel, fixed point of view, sketching, drawing, light and shade, land-landscape, (Cartridge, handmade canvas and Hard-board Handmade, etc.), Pencil, Watercolor, Acrylic Painting.									10 hrs	Apply	
<b>Module-2: Sculpture &amp; Carving</b>											
Pottery Making, Modelling with Clay, terra-cotta, Carving in wood, stone, Plaster of Paris and Metal welding and Art.									10 hrs	Apply	
<b>Module-3: Applied Art</b>											
Book cover design and illustration, Cartoon, Poster Design, Advertisements, Newspaper and Magazines, Animation, Computer-Graphic.									06 hrs	Apply	
<b>Graduate Attributes (As per NBA)</b>											
<ul style="list-style-type: none"> <li>• Modern tool usage (PO5)</li> <li>• The Engineer and Society (PO6)</li> <li>• Individual and Team Work (PO9)</li> <li>• Lifelong Learning (PO12)</li> </ul>											
<b>Instructor</b>											
1	Ms. Sharon Nair			Art Instruction (Freelancer)							

Sl. No.	Course and Course code	Course Title	Teaching Hours/week				Examination			Credits
			Theory Lecture	Tutorial	Practical/ Training	Project	CIE	SEE	Total	
			L	T	P	J				
1	21LCA118-5	Photography	0		2		100	-	100	1

<b>Course Name</b>	<b>Photography</b>	<b>Credits</b>	<b>1</b>
<b>Course Code</b>	<b>21LCA118-5</b>	<b>CIE Marks</b>	<b>50</b>
<b>Number of Lecture Hours/Week</b>	<b>2</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Number of Lecture Hours</b>	<b>26</b>	<b>Exam Hours</b>	<b>01</b>

**Course Objectives:** This course will enable the students to,

- ❖ Develop the skill & knowledge of Digital Photography.
- ❖ Understand and develop the various methods of image capture.
- ❖ Develop the method of basic image editing techniques.
- ❖ Develop various post-production and retouching techniques.

**Pre-requisites:**NIL

**Course Outcomes:** After studying this course, students will be able to:

- ❖ Apply the knowledge of Digital Photography technique in photography.
- ❖ Capture an Image using various capturing methods for different types of photography.
- ❖ Apply various post-production and retouching techniques to the photographs.

**Module-1: Digital Photography and Basics**

Understanding film and paper photography. Learning about the digital revolution. Advantages and disadvantages of digital photography over film photography. Digital method of storing and processing digital image. Representation of digital image: Resolution – Pixel Depth– Pixel Aspect Ratio – Dynamic Colour Range – File Size– Colour Models – Image Compression – File Formats –Calculating image resolution for outputs.	<b>10 hrs</b>	<b>Apply</b>
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**Module-2: Digital Capture and Types of Photography**

Understanding digital cameras, Image Sensors and different capturing methods. Understanding camera lens, additional equipment, filters, lights, films, accessories, positioning, depth of field and exposure. Introduction to most popular types of photography including portrait photography, landscape photography, wildlife photography, Macro photography and High-speed photography etc.	<b>10 hrs</b>	<b>Apply</b>
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**Module-3: Digital Retouching, Image Enhancement and Digital Output**

Understanding the selection of tools and techniques for image enhancement. Learn the use of layers and Photo mounting techniques. Applying selective effects to images like filters, masks and different digital effects.	<b>06 hrs</b>	<b>Apply</b>
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**Graduate Attributes (As per NBA)**

- Modern tool usage (PO5)
- The Engineer and Society (PO6)
- Individual and Team Work (PO9)
- Lifelong Learning (PO12)

**Instructor**

**BNMIT Media Coordinator**



# B.N.M. Institute of Technology

An Autonomous Institution under VTU  
Department of Humanities

ENVIRONMENTAL SCIENCE

YEAR-2021-22

Course Code	<b>21EVS118</b>	CIE Marks	<b>50</b>
Teaching Hours / Week	<b>(L:0 T:2 P: 0)</b>	SEE Marks	<b>50</b>
Credits	<b>01</b>	Exam Hours	<b>03</b>
Total no. of hours	<b>15</b>		
		<b>Hrs</b>	<b>RBT</b>
<b>Module – 1</b>		<b>4 hrs</b>	<b>Understand</b>
<p><b>Environment:</b> Definition, <b>Ecology and Ecosystems:</b> Concept of ecology and ecosystem, Biomes, Ecosystems (Structure and Function): Forest, Desert, Grassland and Aquatic.  <b>Biodiversity:</b> Types, Value, Hot-spots, Threats and Conservation of Biodiversity, Forest Wealth, Deforestation- Consequences: Flooding and Drought, Nature’s Pyramid, Wildlife Management</p>			
<b>Module – 2</b>		<b>3 hrs</b>	<b>Understand</b>
<p><b>Advances in Energy Systems</b> (Merits, Demerits, Global Status and Applications): Ocean Thermal Energy Conversion (OTEC), Tidal, Wind, Nuclear energy, Solar, Hydrogen, Thermal energy (Coal), Net Zero Emissions  <b>Natural Resource Management:</b> Sustainable Mining, Water resources and Cloud Seeding</p>			
<b>Module – 3</b>		<b>3 hrs</b>	<b>Understand</b>
<p><b>Environmental Pollution</b> (Sources, Impacts, and Preventive measures) Water Pollution; Soil Pollution, Air Pollution, Acid rain and Noise pollution  <b>Waste Management &amp; Public Health Aspects</b> ((Sources, Impacts, and Preventive measures): Bio-medical Wastes; Solid waste (urban and industrial wastes), Micro Plastics and E-wastes, Recycling of waste</p>			
<b>Module – 4</b>		<b>2 hrs</b>	<b>Understand</b>
<p><b>Current Environmental Issues</b> (Sources, Impacts, and Preventive measures): Ground water depletion, Climate Change-Greenhouse effect (CO<sub>2</sub>, methane, Ozone layer depletion, CFCs)- Main causes and consequences, Carbon Credits, Economic Impact of Climate change, United Nations Framework Convention on Climate Change (UNFCCC), COPs</p>			
<b>Module – 5</b>		<b>3 hrs</b>	<b>Apply</b>
<p><b>Sustainable Development:</b> Definition, Aims of sustainable development, Environmental Impact Assessments, Environmental Movements: Chipko Movement, Silent Valley Movement, Narmada Dam, Environmental awareness, the role of NGOs(-), Water and Air Act (Prevention and control of Pollution)/Environmental Management Systems, ISO14001, The measures required to ensure the sustainability of industry within state/nation (SPCB/CPCB operations, Role of young people in dealing with the above environmental issues.  <b>Field work:</b> Visit to waste water treatment plant/ Green Building/Study of common plants, insects, fish, birds, mammals and basic principles of identification</p>			
<b>Course outcomes:</b> At the end of the course, students will be able to:			
CO1: Understand the concepts of ecology, environment and biodiversity and the consequences of their destruction.			<b>L2</b>
CO2: Gain awareness about the advances in energy systems as well ways to			<b>L2</b>

manage natural resources.	
CO3: Understand the impact of different kinds of pollution and manage waste through recycling.	<b>L2</b>
CO4: Gain awareness about the current environmental issues and their global impact on various aspects.	<b>L2</b>
CO5: Develop critical thinking and apply them to the analysis of a problem or question related to the environment.	<b>L3</b>
<b>Question paper pattern:</b>	
<ul style="list-style-type: none"> <li>▮ The Question paper will have 100 objective questions.</li> <li>▮ Each question will be for 01 marks</li> <li>▮ Student will have to answer all the questions in an OMR Sheet.</li> </ul>	
The Duration of Exam will be 3 hours.	

<b>Textbook/s</b>				
<b>Sl. No.</b>	<b>Title of the Book</b>	<b>Name of the Author/s</b>	<b>Name of the Publisher</b>	<b>Edition and Year</b>
1	Environmental Studies	Anil Kumar De, Arnab Kumar De	New Age International (P) Limited, Publishers	2018
2.	Environmental Studies	Benny Joseph	Tata Mc Graw – Hill.	2 <sup>nd</sup> Edition, 2012
.3	Environmental Studies	S M Prakash	Pristine Publishing House, Mangalore	3 <sup>rd</sup> Edition, 2018
4.	Environmental Studies – From Crisis to Cure	R Rajagopalan	Oxford Publisher	2005
<b>Reference Books</b>				
1	Principals of Environmental Science and Engineering	Raman Sivakumar	Cengage learning, Singapur.	2 <sup>nd</sup> Edition, 2005
2	Environmental Science – working with the Earth	G. Tyler Miller Jr.	Thomson Brooks / Cole,	11 <sup>th</sup> Edition, 2006
3	Text Book of Environmental and Ecology	Pratiba Sing, Anoop Singh & Piyush Malaviya	Acme Learning Pvt. Ltd. New Delhi.	1 <sup>st</sup> Edition
4.	Assessment of Climate Change over the Indian Region- A Report of the Ministry of Earth Sciences (MoES), Government of India	R. Krishnan, J. Sanjay Chellappan Gnanaseelan Milind Mujumdar Ashwini Kulkarni Supriyo Chakraborty	Springer India ISBN 978-981-15-4327-2 (eBook) <a href="https://doi.org/10.1007/978-981-15-4327-2">https://doi.org/10.1007/978-981-15-4327-2</a>	2020

# *B.N.M. Institute of Technology*

An Autonomous Institution under VTU

I/II Semester – AEC Course

<b>Scientific Foundations of Health</b>			
Course Code	<b>21SFH119/129</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	02 Hours/Week	Total Marks	100
Credits	01	Exam Hours	60 Minutes / 01 Hour
<b>Course objectives:</b> The course 21SFH29 will enable the students: <ul style="list-style-type: none"><li>• To know about Health and wellness (and its Beliefs)</li><li>• To acquire Good Health &amp; It's balance for positive mind-set</li><li>• To Build the healthy lifestyles for good health for their better future</li><li>• To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world</li><li>• To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future</li><li>• To Prevent and fight against harmful diseases for good health through positive mindset</li></ul>			
<b>Teaching-Learning Process (General Instructions)</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes. <ul style="list-style-type: none"><li>✓ Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.<ul style="list-style-type: none"><li>(i) Direct instructional method ( Low /Old Technology),</li><li>(ii) Flipped classrooms ( High/advanced Technological tools),</li><li>(iii) Blended learning ( combination of both),</li><li>(iv) Enquiry and evaluation based learning,</li><li>(v) Personalized learning,</li><li>(vi) Problems based learning through discussion,</li><li>(vii) Following the method of expeditionary learning Tools and techniques,</li></ul></li><li>✓ Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of the concepts of Health and Wellness in general.</li></ul>			
<b>Module-1</b>			
<b>Good Health and It's balance for positive mindset:</b> What is Health, Why Health is very important Now? – What influences your Health?, Health and Behaviour, Health beliefs and advertisements, Advantages of good health (Short term and long term benefits), Health and Society, Health and family, Health and Personality - Profession. Health and behaviour, Disparities of health in different vulnerable groups. Health and psychology, Methods to improve good psychological health. Psychological disorders (Stress and Health - Stress management), how to maintain good health, Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.			
<b>Teaching -Learning Process</b>	Chalk and talk method, Power Point presentation and YouTube videos, Animation videos methods. creating real time stations in classroom discussions. Giving activities & assignments.		

## Module-2

### Building of healthy lifestyles for better future:

Developing a healthy diet for good health, Food and health, Nutritional guidelines for good health and well beingness, Obesity and overweight disorders and its management, Eating disorders - proper exercises for its maintenance (Physical activities for health), Fitness components for health, Wellness and physical function,

#### Teaching-Learning Process

Chalk and talk method, PowerPoint presentation and YouTube videos, Animation videos methods. creating real time stations in classroom discussions. Giving activities & assignments.

## Module-3

### Creation of Healthy and caring relationships :

Building communication skills (Listening and speaking), Friends and friendship - education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering,

#### Teaching-Learning Process

Chalk and talk method, PowerPoint presentation and Animation videos methods. creating real time stations in classroom discussions. Giving activities and assignments.

## Module-4

### Avoiding risks and harmful habits :

Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction develops and addictive behaviors, Types of addictions, influencing factors for addictions, Differences between addictive people and non addictive people and their behavior with society, Effects and health hazards from addictions Such as..., how to recovery from addictions.

#### Teaching-Learning Process

Chalk and talk method, PowerPoint presentation and Animation videos methods. creating real time stations in classroom discussions. Giving activities and assignments.

## Module-5

### Preventing and fighting against diseases for good health :

Process of infections and reasons for it, How to protect from different types of transmitted infections such as...,  
Current trends of socio economic impact of reducing your risk of disease, How to reduce risks for good health,  
Reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life,  
Health and Wellness of youth : a challenge for the upcoming future Measuring of health and wealth status.

#### Teaching-Learning Process

Chalk and talk method, PowerPoint presentation and YouTube videos, Animation videos methods. creating real time stations in classroom discussions. Giving activities & assignments.

### **Course outcome (Course Skill Set)**

At the end of the course the student will be able :

CO 1: To understand Health and wellness (and its Beliefs)

CO 2: To acquire Good Health & It's balance for positive mindset

CO 3: To inculcate and develop the healthy lifestyle habits for good health.

CO 4: To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world

CO 5: To adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus.

CO 6: To positively fight against harmful diseases for good health through positive mindset.

### **Assessment Details (both CIE and SEE)**

methods of CIE need to be defined topic wise i.e.- Tests, MCQ, Quizzes, Seminar or micro project/Course Project, Term Paper)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 35% of maximum marks in SEE and a minimum of 40% of maximum marks in CIE. Semester End Exam (SEE) is conducted for 100 marks (3 hours' duration) and scaled down to 50 marks. Based on this grading will be awarded.

The student has to score a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

### **Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

**(All tests are similar to the SEE pattern i.e question paper pattern is MCQ)**

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Report writing /Group discussion/Seminar any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

### **Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for subject

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is **01 hours**

### **Suggested Learning Resources:**

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.
  2. **Health Psychology - A Textbook**, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press
  3. **HEALTH PSYCHOLOGY (Ninth Edition)** by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press
  4. **Scientific Foundations of Health (Health & Wellness) - General Books** published for university and colleges references by popular authors and published by the reputed publisher.
- 1) **SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos** and other materials / notes

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- ✓ Contents related activities (Activity-based discussions)
  - ✓ For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - ✓ Organizing Group wise discussions and Health issues based activities
  - ✓ Quizzes and Discussions
  - ✓ Seminars and assignments
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