

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**  
**DEPARTMENT OF COMPUTER SCIENCE**  
**COURSE CURRICULUM**

<b>PART- A: Introduction</b>			
<b>Program:</b> Bachelor in Science (CS) <i>(Certificate / Diploma / Degree/Honors)</i>		<b>Semester – III</b>	<b>Session:</b> 2024-2025
1	<b>Course Code</b>	<b>CSSC -03T</b>	
2	<b>Course Title</b>	<b>Data Structure</b>	
3	<b>Course Type</b>	<b>DSC (Discipline Specific Course)</b>	
4	<b>Prerequisite (if, any)</b>	<i>As per program</i>	
5	<b>Course Learning Outcomes (CLO)</b>	At the end of this course, the students will be able to: <ul style="list-style-type: none"> <li>• Understand the fundamentals and applications of data structure.</li> <li>• Utilize various algorithms for real world problem solving.</li> <li>• Understanding about data management in computer memory.</li> <li>• Apply stack, Queue, Lists, Trees and Graphs for real world application.</li> <li>• Understand how various data structures can be used to implement through any programming language.</li> </ul>	
6	<b>Credit Value</b>	<b>3 Credits</b>	<i>Credit = 15 Hours - Learning &amp; Observation</i>
7	<b>Total Marks</b>	<b>Max. Marks: 100</b>	<b>Min Passing Marks: 40</b>
<b>PART -B: Content of the Course</b>			
<b>Total No. of Teaching–Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)</b>			
Unit	Topics (Course contents)	No. of Period	
<b>I</b>	<b>Introduction and Basic Concepts:</b> Introduction, Fundamentals of Algorithms, Data types: Primitive, Non-Primitive Absent Data Type (ADT), Classification of Data Structure: Linear and Nonlinear Data Structure. <b>Array:</b> Arrays and its types, Memory allocation and address calculations of Array, Sparse Array. <b>Linked List:</b> Types of Linked List and various Operations Like INSERT, DELETE, TRAVERSE. Introduction and Application of Stack and Queue.	<b>12</b>	
<b>II</b>	<b>Stack:</b> Definition, Operations PUSH, POP, Implementations using Array and Linked list, Applications of Stack: Infix, Prefix, Postfix representation and conversion using Stack, Postfix expression evaluation using Stack, Recursion using Stack. <b>Queue:</b> Definition, Types of Queues: Priority Queue, Circular queue, Double Ended Queue, operations of Queue INSERT, DELETE, TRAVERSE, Implementation Queue using Array and Linked list, Applications of Queue.	<b>11</b>	
<b>III</b>	<b>Tree:</b> Definition of Trees and their types, Binary trees, Properties of Binary trees and operations Insertion, deletion, searching and traversal algorithm: preorder, post order, in-order traversal, Binary Search Trees, Implementations, AVL Trees. <b>Graph:</b> Definition of Graph and their types, Adjacency and Incident (matrix & linked list) Representation of graphs, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of Graphs; Weighted Graphs, Shortest Path Algorithm, Spanning Tree, Minimum Spanning Tree, Kruskal’s and Prim’s Algorithms.	<b>11</b>	
<b>IV</b>	<b>Sorting Methods:</b> Types of Sorting Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Radix Sort. <b>Searching:</b> Linear search, Binary search.	<b>11</b>	
<b>Keywords</b>	<i>Data, ADT, Array, Linked List, Stack, Queue, Tree, Graph, Searching, Sorting.</i>		
<b>Name and Signature of Convener &amp; Members of CBoS:</b>			
<i>Dr. H. S. Bhatnagar</i> Chairman	<i>Karen</i> Sunita	<i>Yash</i> Anshu	<i>Shailendra</i> Anshu
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**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**  
**DEPARTMENT OF COMPUTER SCIENCE**  
**COURSE CURRICULUM**

<b>PART- A: Introduction</b>			
Program: Bachelor in Science (CS) (Certificate / Diploma / Degree)		Semester - III	Session: 2025-2026
1	Course Code	CSSC-03P	
2	Course Title	Lab 3: Data Structure Using C++	
3	Course Type	DSC	
4	Prerequisite	<i>As per program</i>	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none"> <li>• Understand how the concept of data structure can be implemented programmatically.</li> <li>• Implement the fundamentals data structure through C and C++</li> <li>• Understand the functioning of Array and linked list programmatically.</li> <li>• Understand the applications of array, linked list stack, queue, tree and graph programmatic.</li> <li>• Write programs for various data structures for real world application.</li> </ul>	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field Learning/Training</i>
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
<b>PART -B: Content of the Course</b>			
<b>Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)</b>			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment	<ol style="list-style-type: none"> <li>1. Write a program to create a square matrix, fill the data inside and print the diagonal elements.</li> <li>2. Write a program to perform addition and subtraction on two matrices.</li> <li>3. Write a program to perform multiplication on two matrices.</li> <li>4. Write a program to perform insertion, deletion of nodes from the end in singly linked list.</li> <li>5. Write a program to perform insertion and deletion of nodes from the end in singly linked list.</li> <li>6. Write a program to perform insertion and deletion of nodes from the end in circular doubly linked list.</li> <li>7. Write a program to perform push and pop operations in stack, where stack should be created using array.</li> <li>8. Write a program to perform push and pop operation in stack, where stack should be created linked list.</li> <li>9. Write a program to calculate factorial of given number using stack.</li> <li>10. Write a program to perform insertion and deletion of data items in queue, queue should be implemented by using a linked list.</li> <li>11. Write a program to perform insertion and deletion of data items in queue, queue should be implemented by using arrays.</li> <li>12. Write a program to demonstrate functioning of a double ended queue.</li> <li>13. Write a program to read the postfix arithmetic expression and evaluate its value using the stack.</li> <li>14. Write a program to show how to handle the overflow and underflow situation in stack.</li> <li>15. Write a program to convert infix notation-based expression into the postfix notation-based expression using the stack.</li> <li>16. Write a program to implement the concept of priority-based element</li> </ol>		<b>30</b>



- <https://www.youtube.com/watch?v=g1USSZVWDsY&list=PLBF3763AF2E1C572F&index=2>
- NPTEL YouTube Channel: Queues and linked list  
<https://www.youtube.com/watch?v=PGWZUgzDMYI&list=PLBF3763AF2E1C572F&index=3>
- NPTEL YouTube Channel: Trees  
<https://www.youtube.com/watch?v=tORLeHHtazM&list=PLBF3763AF2E1C572F&index=6>
- NPTEL YouTube Channel: Graphs  
<https://www.youtube.com/watch?v=9zpSs845wf8&list=PLBF3763AF2E1C572F&index=24>
- W3schools Data Structure Reference: [DSA Tutorial \(w3schools.com\)](http://www.w3schools.com)

**PART -D: Assessment and Evaluation**

**Suggested Continuous Evaluation Methods:**

Maximum Marks: **50 Marks**  
 Continuous Internal Assessment (CIA): **15 Marks**  
 End Semester Exam (ESE): **35 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): <b>10 &amp; 10</b>	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against <b>15 Marks</b>
	Assignment/Seminar +Attendance - <b>05</b> Total Marks - <b>15</b>	

End Semester Exam (ESE):	<b>Laboratory / Field Skill Performance: On spot Assessment</b>		Managed by Course teacher as per lab. status
	A. Performed the Task based on lab. work	- 20 Marks	
	B. Spotting based on tools & technology (written)	- 10 Marks	
	C. Viva-voce (based on principle/technology)	- 05 Marks	

Name and Signature of Convener & Members of CBoS:

Dr. H. S. Hota  
chairman

Shubil

(Suresh Thakur)

for teacher

Shreeram An

Ar. Vik. Gupta

ANJEETA KUTUK



## PART-C: Learning Resources

### Text Books, Reference Books and Others

#### Text Books Recommended:

- Andrew S. Tanenbaum, Computer Networks, PHI / Pearson Education Inc.
- Behrouz A. Forouzan, Data Communication and Networking, Tata McGraw-Hill.

#### Reference Books Recommended:

- William Stallings, Data and Computer Communication, Pearson Education.
- Nader F. Mir, Computer and Communication Networks, Pearson Education, 2007.
- Black, Data & Computer Communication, PHI

#### Online Resources:

- NPTEL link for Data Communication:  
<https://nptel.ac.in/courses/106105082>
- Introduction to Data Communication from SWAYAM Portal  
[https://www.youtube.com/watch?v=swtH\\_okidQc&list=PLUtvVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=1](https://www.youtube.com/watch?v=swtH_okidQc&list=PLUtvVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=1)
- Layered Architecture  
<https://www.youtube.com/watch?v=xHO6LjSHco0&list=PLUtvVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=2>
- Data and Signal  
<https://www.youtube.com/watch?v=6ZGVZ7gUccE&list=PLUtvVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=3>
- Guided Transmission Media  
<https://www.youtube.com/watch?v=y7v3EAJsWXA&list=PLUtvVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=5>
- Unguided Transmission Media  
<https://www.youtube.com/watch?v=hKq1tYIVxdQ&list=PLUtvVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=6>

## PART -D: Assessment and Evaluation

### Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 + 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	

End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks
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### Name and Signature of Convener & Members of CBoS:

Dr. H.S. Hota  
Chairman

*[Signature]*

*[Signature]*

*[Signature]*

*[Signature]*

*[Signature]*

*[Signature]*  
(Stores & Theater)

*[Signature]*  
Secretary

*[Signature]*  
Member

*[Signature]*  
ANJEETA KURU

*[Signature]*

# FOUR YEAR UNDER GRADUATE PROGRAM (2024-28)

## DEPARTMENT OF MATHEMATICS


### COURSE CURRICULUM

<b>Part A: Introduction</b>			
Program: Bachelor in Science (Diploma/Degree/Honors)		Semester - III	Session:2024-2025
1	Course Code	<b>MASC-03</b>	
2	Course Title	<b>Differential Equations</b>	
3	Course Type	<b>Discipline Specific Course (DSC)</b>	
4	Pre-requisite(if any)	Knowledge of basic Differential and Integral calculus and differential equation.	
5	Course Learning Outcome (CLO)	<b>This Course will enable the students to:</b> <ul style="list-style-type: none"> <li>➤ Learn various techniques of getting exact solutions of certain solvable first order differential equations and linear differential equations of second order.</li> <li>➤ Understand the genesis of ordinary as well as partial differential equations.</li> <li>➤ Learn about solution of first order linear partial differential equations using Lagrange's method.</li> <li>➤ Know how to solve second order linear partial differential equations with constant coefficients.</li> </ul>	
6	Credit Value	<b>4 C</b>	1Credit = 15 hours- Learning and Observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

### Part B: Content of the Course

**Total no of teaching – learning period =60 Periods (60 Hours)**

UNIT	Topics	No of Periods
I	<b>Contributions and Biography of Indian Mathematicians:</b> Aryabhata, Varahmihir, Bhaskar-I, Shreedharacharya, Shreepati and Parmeshwar. <b>First Order and higher degree Differential Equations :</b> Differential equations of first order and first degree, Equations in which variables are separable, Homogeneous equations, Linear differential equations and equations reducible to linear form, Exact differential equations, Integrating factor, First order higher degree equations solvable for x, y and p, Clairaut's form and singular solutions, orthogonal trajectories.	15
II	<b>Linear and Ordinary simultaneous differential equations:</b> Linear differential equations with constant coefficients, Homogeneous linear ordinary differential equations. Linear differential equations of second order. Transformation of the equation by changing the dependent variable/the independent variable. Method of variation of parameters. Ordinary simultaneous differential equations.	15
III	<b>First order Partial differential equations:</b> Lagrange's solution, Some special types of equation which can be solved by methods other than general method, Charpit's general method of solution.	15



7

IV	<b>Second and higher order Partial differential equations:</b> Classification of Linear partial differential equation of second order, Homogeneous and non-homogeneous equation with constant coefficients, Partial differential equation reducible to equation with constant coefficients. Monge's Method.	15
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**Part C - Learning Resource**

**Text Books, Reference Books, Other Resources**

**Text Books Recommended-**

1. Dr. M. D. Rajsinghania, Ordinary and partial Differential Equation, S. Chand and company Pvt.Ltd.
2. A.H. Siddiqi and P. Manchanda, A first course in Differential Equations with Applications, Macmillan India Ltd.

**Reference Books Recommended-**

3. Erwin Kreyszig (2011). *Advanced Engineering Mathematics* (10<sup>th</sup> edition). J. Wiley & Sons
4. B. Rai & D. P. Choudhury (2006). *Ordinary Differential Equations - An Introduction*. Narosa Publishing House Pvt. Ltd. New Delhi.
5. Shepley L. Ross (2007). *Differential Equations* (3<sup>rd</sup> edition). Wiley.
6. George F. Simmons (2017). *Differential Equations with Applications and Historical Notes* (3<sup>rd</sup> edition). CRC Press. Taylor & Francis.
7. Ian N. Sneddon (2006). *Elements of Partial Differential Equations*. Dover Publications.

**E-resources:** <https://onlinecourses.nptel.ac.in>  
<https://epqp.inflibnet.aci.in>  
<https://swayam.gov.in>  
<https://www.mooc.org>

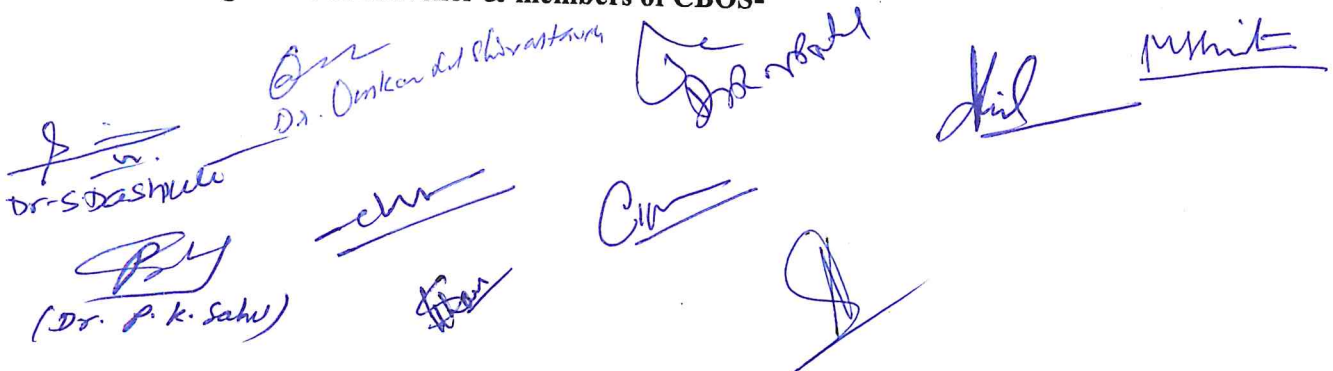
**Part D: Assessment and Evaluation**

**Suggested Continuous Evaluation Methods:**

**Maximum Marks: 100 Marks**  
**Continuous Internal Assessment (CIA): 30 Marks**  
**End Semester Examination (ESE): 70 Marks**

<b>Continuous Internal Assessment (CIA)</b> (Conducted by course teacher)	Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
<b>End Semester Examination (ESE)</b>	<b>Two Section-A&amp;B</b> Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	

**Name and signature of convener & members of CBOS-**


  
 Dr. S. Dashmule  
 Dr. P. K. Sahu  
 Dr. Omkar D. Shivastava  
 Dr. ...  
 ...  
 ...  
 ...  
 ...  
 ...

**FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)**  
**DEPARTMENT OF MATHEMATICS**  
**COURSE CURRICULUM**

<b>Part A: Introduction</b>			
<b>Program: Bachelor in Science (Diploma/Degree/Honors)</b>		<b>Semester - III</b>	<b>Session:2024-2025</b>
1	Course Code	<b>MASE-01</b>	
2	Course Title	Advanced Calculus	
3	Course Type	Discipline Specific Elective (DSE)	
4	Pre-requisite ( if any)	Basic idea of elementary differential and integral calculus	
5	Course Learning Outcome (CLO)	<p><b>This Course will enable the students to:</b></p> <ul style="list-style-type: none"> <li>➤ Calculate the limit and examine the continuity and understand the concepts of limit , continuity and differentiability of functions of more than one variable with geometrical interpretation.</li> <li>➤ To Understand the concepts of mean value theorems with their applications .</li> <li>➤ To understand the concept of maxima and minima for functions of two and three variables with their uses and techniques</li> <li>➤ Understand conceptual variations while advancing from one variable to several variables in calculus.</li> <li>➤ Understand the concept of integration of functions of two and three variables and their evaluation technique with emphasis on beta and gamma functions .</li> </ul>	
6	Credit Value	<b>4 C</b>	1Credit = 15 hours- Learning and observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

**Part B: Content of the Course**

**Total no of teaching – learning period =60 Periods (60 Hours)**

UNIT	Topics	No of Periods
<b>I</b>	Limit and continuity of function of two and three variables. Mean value theorems of function of two variables- First mean value theorem and Taylor's theorem. Partial Differentiation and Euler's theorem on homogeneous functions, Change of variables.	<b>15</b>
<b>II</b>	Partial Derivation and differentiability of function of two variables. Schwartz's theorem, Young's theorem, Implicit function theorem. Fourier series, Fourier expansion of piece wise monotonic function.	<b>15</b>
<b>III</b>	Jacobians , Maxima, Minima and saddle points of function of two variables. Lagrange's multipliers method. Envelopes, Evolutes	<b>15</b>
<b>IV</b>	Beta and Gamma function. Double and triple integrals .Dirichelet's integrals. Change of order of integration.	<b>15</b>

*(Dr. S. Dashputra)*

*Dr. Ankan Lal Shrivastava*

*Mishra*

*(Dr. P. K. Sahu)*

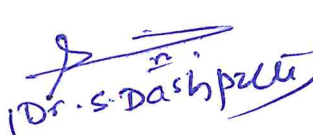
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<b>Part C - Learning Resource</b>		
Text Books, Reference Books, Other Resources		
<b>Text Books Recommended-</b>		
1. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.		
2. Mathematical Analysis, S.C. malik and S. Arora, New age international, Delhi		
3. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition). Wiley India.		
4. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.		
5. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs.		
6. Principles of Mathematical analysis, W. Rudin, McGraw Hill Publication		
7. Jerrold Marsden, Anthony J. Tromba & Alan Weinstein (2009). Basic		
8. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.		
<b>E-resources:</b> <a href="https://onlinecourses.nptel.ac.in">https://onlinecourses.nptel.ac.in</a> <a href="https://epqp.inflibnet.aci.in">https://epqp.inflibnet.aci.in</a> <a href="https://swayam.gov.in">https://swayam.gov.in</a> <a href="https://www.mooc.org">https://www.mooc.org</a>		
<b>Part D: Assessment and Evaluation</b>		
<b>Suggested Continuous Evaluation Methods:</b>		
<b>Maximum Marks:</b>		<b>100 Marks</b>
<b>Continuous Internal Assessment (CIA):</b>		<b>30 Marks</b>
<b>End Semester Examination (ESE):</b>		<b>70 Marks</b>
<b>Continuous Internal Assessment (CIA)</b> (Conducted by course teacher)	Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
<b>End Semester Examination (ESE)</b>	<b>Two Section-A&amp;B</b> Section-A: Q1. Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	


Name and signature of convener & members of CBOS-


  
 Dr. S. Dashputra


  
 Dr. Amitkand Shivastava

  
 Dr. P. K. Sahu

  
 Dr. Anil Kumar

  
 Dr. Manoj Kumar

  
 Dr. Anand

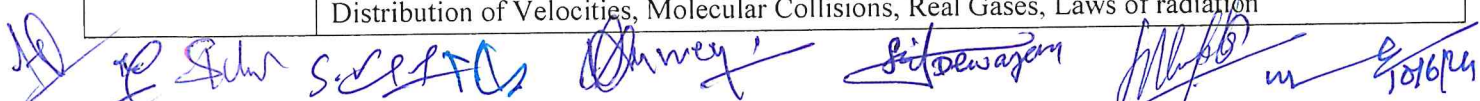
  
 Dr. Anand

# FOUR YEARS UNDERGRADUATE PROGRAM (2024-28)

## DEPARTMENT OF PHYSICS

### COURSE CURRICULUM

<b>PART – A: INTRODUCTION</b>			
<b>Program: Bachelor in Science (Diploma/ Degree/ Honors)</b>		<b>Semester: III</b>	
		<b>Session: 2024-25</b>	
1	<b>Course Code</b>	<b>PHSC-03T</b>	
2	<b>Course Title</b>	<b>Heat and Thermodynamics</b>	
3	<b>Course Type</b>	<b>Discipline Specific Course</b>	
4	<b>Pre-requisite (if any)</b>	<b>As per Program</b>	
5	<b>Course Learning Outcomes (CLO)</b>	After going through the course, the student should be able to: <ul style="list-style-type: none"> <li><input type="checkbox"/> Demonstrate a deep comprehension of the fundamental principles of thermodynamics, including concepts such as energy, entropy and laws of thermodynamics.</li> <li><input type="checkbox"/> Apply the laws of thermodynamics to analyze and solve problems related with energy transfer, heat engines, refrigeration system and other thermodynamic processes.</li> <li><input type="checkbox"/> Analyze basic aspects of kinetic theory and transport phenomenon in gases.</li> </ul>	
6	<b>Credit Value</b>	<b>03 Credits</b>	<b>1 Credit= 15 Hours for Learning &amp; Observation</b>
7	<b>Total Marks</b>	<b>Maximum Marks: 100</b>	<b>Minimum Pass Marks: 40</b>
<b>PART – B: CONTENT OF THE COURSE</b>			
<b>Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)</b>			
Unit	Topics (Course contents)		No. of Period
<b>I</b>	<b>Historical background:</b> A brief historical background of thermodynamics and statistical physics in the context of India and Indian culture, Contribution of S. N. Bose in Statistical mechanics. <b>Laws of Thermodynamics:</b> Thermodynamic Description of system, Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, various Thermodynamical Processes, Work Done during Isothermal and Adiabatic Processes, Reversible & irreversible processes. Second law of thermodynamics & Entropy, Carnot's cycle, Carnot's theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics.		12
<b>II</b>	<b>Thermodynamic Potentials:</b> Internal Energy, Enthalpy, Helmholtz Free Energy and Gibbs function. Maxwell's relations & applications, Clausius- Clapeyron Equation, Expression for ( $C_p - C_v$ ), $C_p/C_v$ , TdS equations, Thermodynamic energy equation- change in internal energy of an ideal and Vander Waal's gas, Joule-Thompson Effect, Cooling by adiabatic demagnetization.		11
<b>III</b>	<b>Kinetic Theory of Gases:</b> Maxwellian distribution of speeds in an ideal gas: distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values, Molecular Collision and Mean Free Path. <b>Transport Phenomena in gases:</b> Viscosity, Conduction and Diffusion, Law of equipartition of energy.		11
<b>IV</b>	<b>Theory of Radiation:</b> Blackbody radiation, Spectral distribution, Concept of Energy Density, Stefan Boltzmann Law, Newton's law of cooling from Stefan Boltzmann's law. Wien's displacement law and Rayleigh-Jeans Law (Only qualitative). Planck's radiation Law, Deduction of Wien's distribution law and Rayleigh- Jeans Law from Planck's law. Experimental verification of Planck's radiation law.		11
<b>Keywords:</b>	Zeroth and First Law of Thermodynamics, Second Law of Thermodynamics, Entropy, Thermodynamic Potentials, Maxwell's Thermodynamic Relations Kinetic Theory of Gases, Distribution of Velocities, Molecular Collisions, Real Gases, Laws of radiation		



Signature of Convener & Members (CBoS) :

## PART – C: LEARNING RESOURCES

### Text Books, Reference Books and Others

#### Text Books

1. Heat and Thermodynamics: Singhal, Agrawal and Satya Prakash, Pragati Prakashan 1984
2. Physics (Part-2): Editor, Prof. B.P.Chandra, M.P. Hindi Granth Academy
3. Unified Physics –II, R.P.Goyal, Shivalal Agrawal & Sons
4. Unified Physics –II. NovbodhPrakashan

#### Reference Books

1. Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears & G.L.Salinger. 1988, Narosa
2. Energy Science in Vedas: A Treatise on Vedic Thermodynamics and Free Energy (Exploring Lost Science and Technology in Vedas), Ramesh Kumar Mineria; Priya Veda Publications

### Online Resources (e-books/ learning portals/ other e-resources)

1. Basics of thermodynamics  
<https://www.youtube.com/watch?v=9GMBpZZtjXM&list=PLD8E646BAB3366BC8>
2. Thermodynamics <https://www.youtube.com/watch?v=E9cOAMhFUz0>
3. Second law of thermodynamics [https://www.youtube.com/watch?v=F\\_fIGosPY8o](https://www.youtube.com/watch?v=F_fIGosPY8o)
4. NPTEL Online Lectures: <https://archive.nptel.ac.in/courses/115/105/115105129/>
5. <https://archive.nptel.ac.in/courses/115/106/115106090/>
6. <https://bsc.hcverma.in/course/penopcy>
7. Vedic Science and Thermodynamics : <https://www.puranavedas.com/vedic-physics/>
8. <https://www.amazon.in/Vedic-Physics-Raja-Ram-Mohan/dp/0968412009?asin=1988207045&revisionId=&format=4&depth=2>
9. <https://ia903100.us.archive.org/3/items/wholelottabooks/The%20Astronomical%20Code%20of%20the%20Rgveda%20-%20Shubash%20Kak.pdf>

## PART – D: Assessment and Evaluation

### Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Examination (ESE): 70 Marks

<b>Continuous Internal Assessment (CIA):</b> (By course teacher)	Internal Test/ Quiz (2): <del>20</del> 20 Assignment/ Seminar (1): 10 Total Marks: 30	Better marks out of the two Test / Quiz+ marks obtained in Assignment shall be considered against 30 Marks
<b>End Semester Exam (ESE):</b>	<b>Two section – A &amp; B</b> Section A: Q1. Objective – 10 x 1 = 10 Mark; Q2. Short answer type- 5x4 = 20 Marks Section B: Descriptive answer type, 1 out of 2 from each unit- 4x10 = 40 Marks	

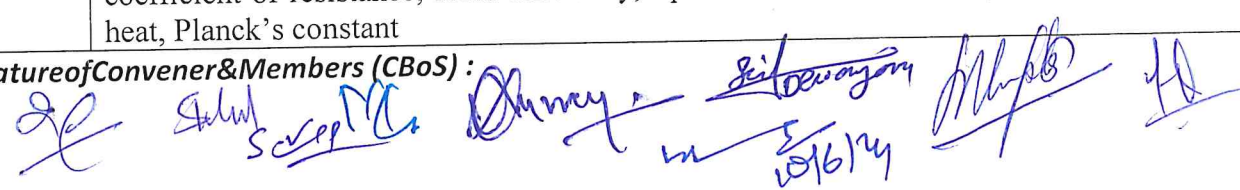
Name and Signature of Convener & Members of CBoS:



**FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28)**  
**DEPARTMENT OF PHYSICS**  
**COURSE CURRICULUM**

<b>PART – A: INTRODUCTION</b>			
<b>Program: Bachelor in Science (Diploma/ Degree/ Honors)</b>		<b>Semester: III</b>	
		<b>Session: 2024-25</b>	
1	Course Code	<b>PHSC- 03P</b>	
2	Course Title	<b>Heat and Thermodynamics</b>	
3	Course Type	<b>Discipline Core Course</b>	
4	Pre-requisite (if any)	<b>As per Program</b>	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>➤ Lab Proficiency: Thermometers, pressure gauges, calorimeters, heat transfer apparatus, experimental setup, data acquisition.</li> <li>➤ Hands-on Learning***: Heat transfer, work done, entropy, phase transitions, experiments.</li> <li>➤ Data Analysis: Experimental data, theoretical discrepancies, analysis.</li> <li>➤ Predictive Skills: Thermodynamic behavior, varying conditions, experimentation.</li> <li>➤ Theory-Practice Integration: Theoretical knowledge, practical lab work, synthesis, applications.</li> </ul>	
6	Credit Value	<b>01 Credit</b>	<b>1 Credit = 30 Hours Laboratory Work</b>
7	Total Marks	<b>Maximum Marks: 50</b>	<b>Minimum Pass Marks: 20</b>
<b>PART – B: CONTENT OF THE COURSE</b>			
<b>Total No. of learning-Training/performance Periods -30 Periods (30 Hours)</b>			
Sr. No.	Objects (At least 10 of the following or related Experiments)	No. of Periods	
<b>1</b>	To determine the thermal conductivity of a non-conducting material by Lee’s disc method.	<b>30</b>	
<b>2</b>	To study the variation of thermo emf across two junctions of a thermocouple with temperature.		
<b>3</b>	To verify Newton’s law of cooling.		
<b>4</b>	To determine the temperature co-efficient of resistance by Platinum resistance thermometer.		
<b>5</b>	To determine the coefficient of thermal conductivity(k) of a rubber tube.		
<b>6</b>	To study the heat efficiency of an electric kettle with varying voltage.		
<b>7</b>	To determine the ratio of specific heat at constant pressure and constant volume ( $\gamma=C_p/C_v$ ) of air Clement and Desorme’s method.		
<b>8</b>	To determine the coefficient of thermal conductivity of copper by Searle’s Apparatus.		
<b>9</b>	To study the variation of thermos-Emf of thermos couple with Difference of Temperature of its Two Junctions.		
<b>10</b>	To determine Mechanical Equivalent of Heat, J, by Callender and Barne’s constant flow method.		
<b>11</b>	Measurement of Planck’s constant using black body radiation.		
<b>12</b>	To determine Stefan’s Constant.		
<b>Keywords:</b>	Thermal conductivity, Thermocouple, Newton’s law of cooling, Temperature coefficient of resistance, Heat efficiency, Specific heat ratio, Mechanical equivalent of heat, Planck’s constant		

**Signature of Convener & Members (CBOs):**



## PART – C: LEARNING RESOURCES

### Text Books, Reference Books and Others

#### Text Books Recommended-

1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
4. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.
5. Unified Practical Physics B.Sc II : R P Goyal, Shival Agrawal & Sons Publications

#### Reference Books Recommended-

1. Practical Physics by C.L. Arora
2. Practical Physics by S.L. Gupta and Vijay Kumar
3. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint

#### Online Resources (e-books/ learning portals/ other e-resources)

Link for e-Books for Physics Practical and Virtual labs

1. Thermal Physics and Statistical Mechanics: Laboratory Collection <https://egyankosh.ac.in/handle/123456789/67450>
2. Virtual Lab : <https://vlab.amrita.edu/index.php?sub=1&brch=194>
3. <https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1>
4. <https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=801&cnt=4>
5. <https://srmap.edu.in/seas/physics-virtual-lab/>
6. <https://sites.google.com/view/vlab-bnmitmech/home/heat-transfer-lab>  
<https://www.pbslearningmedia.org/resource/lsp07-sci-phys-thermalenergy/thermal-energy-transfer/#.WdJiOJrLIU>

## PART – D: ASSESSMENT AND EVALUATION

### Suggested Continuous Evaluation Methods:

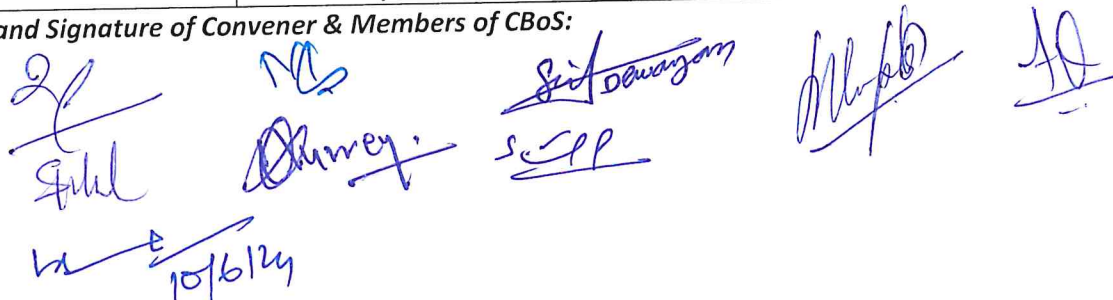
Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

EndSemester Exam(ESE):35 Marks

<b>Continuous Internal Assessment(CIA):</b> (By Course Teacher)	Internal Test / Quiz-(2): <b>10 &amp; 10</b> Assignment/Seminar +Attendance – <b>05</b> Total Marks - <b>15</b>	Better marks out of the two Test / Quiz + <b>Marks</b> obtained in Assignment shall be considered against <b>15</b> Marks
	<b>End Semester Exam (ESE):</b>	Laboratory Performance: On spot Assessment Performed the Task based on lab. work - <b>20</b> Marks Spotting based on tools & technology (written) – <b>10</b> Marks Viva-voce (based on principle/technology) - <b>05</b> Marks

Name and Signature of Convener & Members of CBoS:


  
 The image shows five handwritten signatures in blue ink. The first signature is on the left, followed by a second, then a third, a fourth, and a fifth on the right. Below the first signature, there is a date '10/6/24' written in blue ink.

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**  
**DEPARTMENT OF PHYSICS**  
**COURSE CURRICULUM**

<b>PART-A: INTRODUCTION</b>			
<b>Program : Bachelor in Science</b> <i>(Diploma / Degree/Honors)</i>		<b>Semester - III</b>	<b>Session: 2024-2025</b>
1	<b>Course Code</b>	<b>PHSE-01</b>	
2	<b>Course Title</b>	<b>Introduction to Statistical Mechanics</b>	
3	<b>Course Type</b>	<b>Discipline Specific Elective</b>	
4	<b>Pre-requisite (if, any)</b>	<b>As per Program</b>	
5	<b>Course Learning Outcomes(CLO)</b>	<ul style="list-style-type: none"> <li>➤ Differentiate between macrostate and microstate and calculate their numbers</li> <li>➤ Comprehend the concept of ensembles and its requirement in study of physical phenomenon</li> <li>➤ Correlate and compare the classical and quantum statistical distribution laws.</li> <li>➤ Apply concepts of statistical distribution laws for different physical systems.</li> </ul>	
6	<b>Credit Value</b>	<b>4 Credits</b>	<i>Credit = 15 Hours -learning &amp; Observation</i>
7	<b>Total Marks</b>	<b>Max. Marks: 100</b>	<b>Min Passing Marks: 40</b>

**PART -B: CONTENT OF THE COURSE**

Total No.of Teaching-learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course Contents)	No. of Period
<b>I</b>	<p><b>Maxwellian Distribution of Speeds In An Ideal Gas:</b>            Distribution of speeds and velocity, experimental verification, distinction between mean, rms and most probable speeds, Doppler broadening of spectral lines, transport phenomena in gases: molecular collision, collision cross section, estimates of molecular diameter and mean free path; transport of mass , momentum and energy and inter-relationship, dependence on temperature and pressure.</p> <p><b>Behaviour of Real Gases :</b>deviation from ideal gas equation, the Virial equation, Andrew’s experiment on CO<sub>2</sub> gas; critical constants.</p>	<b>15</b>
<b>II</b>	<p><b>Macrostate &amp; Microstate</b>            Macrostate, Microstate, Number of accessible microstates and Postulate of equal a priori.</p> <p><b>Concept of Ensemble:</b> Concept of Gibb’s ensemble, postulate of ensemble average, Micro Canonical, Canonical &amp; Grand Canonical ensembles. Thermodynamic Probability, Postulate of Equilibrium and Boltzmann Entropy relation. Phase space, Phase trajectory, Volume element in phase space, Quantization of phase space and number of accessible microstates for free particle in 1D, free particle in 3D.</p>	<b>15</b>

III	<p><b>Transition to quantum statistics:</b> <math>h</math> as a natural constant and its implications, cases of particle in 1D and 1Dimensional harmonic oscillator,</p> <p><b>Quantum Statistical Distribution Laws:</b> In-distinguishability of particles and its consequences, Bose-Einstein &amp; Fermi Dirac statistics. Comparison of statistical distribution laws and their physical significance. Canonical Distribution Law: Boltzmann's Canonical Distribution Law, Boltzmann's Partition Function, Proof of Equipartition Theorem (Law of Equipartition of energy) and relation between Partition function and Thermodynamic potentials.</p>	15
IV	<p><b>Bose-Einstein Distribution Law and its Applications:</b> Bose-Einstein Statistics: Heat capacity, Bose Einstein condensation, Radiation as a photon gas, Quantum Theory of Radiation: Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law</p> <p><b>Fermi-Dirac Distribution Law and its Applications:</b> Free electrons in a metal, Definition of Fermi energy, Determination of Fermi energy at absolute zero, Kinetic energy of Fermi gas at absolute zero and concept of Density of States, Specific Heat of Metals (Density of Orbitals).</p>	15
Keywords	Macrostate & Microstate, ensemble, distribution laws, Bose-Einstein Statistics, Fermi-Dirac Statistics	

Name and Signature of Convener & Members of CBoS:

The image shows several handwritten signatures in blue ink. From left to right, there are approximately seven distinct signatures. The signatures are written in a cursive style. One signature on the right includes the date '10/6/14' written below it.

## PART-C: LEARNING RESOURCES

### Text Books, Reference Books and Others

#### Text Books Recommended –

1. Unified Physics –II, R P Goyal, Shivlal Agrawal & Sons Publication
2. Unified Physics-II, Yugbodh Prakashan
3. Unified Physics-II, Navbodh Prakashan

#### Reference Books Recommended–

1. F. Reif, “Statistical Physics (In SI Units): Berkeley Physics Course Vol 5”, McGraw Hill, 2017
2. B.B. Laud, “Fundamentals of Statistical Mechanics”, New Age International Private Limited, 2020
3. B.K. Agarwal, M. Eisner, “Statistical Mechanics”, New Age International Private Limited, 2007

#### Online Resources–e-Resources / e-books and e-learning portals

1. MIT Open Learning - Massachusetts Institute of Technology, <https://ocw.mit.edu/courses/8-333-statistical-mechanics-i-statistical-mechanics-of-particles-fall-2013/>
2. National Programme on Technology Enhanced Learning (NPTEL), <https://archive.nptel.ac.in/courses/115/103/115103113/>,
3. [https://onlinecourses.nptel.ac.in/noc19\\_ph10/preview](https://onlinecourses.nptel.ac.in/noc19_ph10/preview),
4. <https://archive.nptel.ac.in/courses/115/106/115106126/>
5. Uttar Pradesh Higher Education Digital Library, <http://heecontent.upsdc.gov.in/SearchContent.aspx>
6. Swayam Prabha - DTH Channel, [https://www.swayamprabha.gov.in/index.php/program/current\\_he/8](https://www.swayamprabha.gov.in/index.php/program/current_he/8)

## PART-D: ASSESSMENT AND EVALUATION

### Suggested Continuous Evaluation Methods:

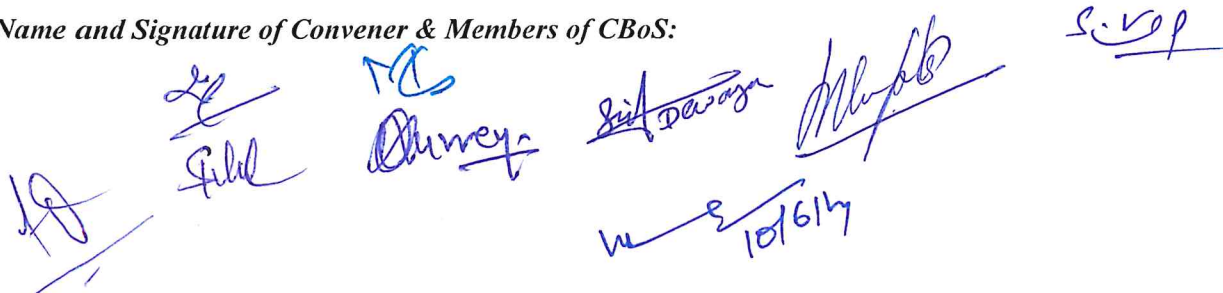
Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

<b>Continuous Internal Assessment(CIA):</b> (By Course Teacher)	Internal Test / Quiz-(2):	20 & 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment/Seminar- Total Marks -	10 30	
<b>End Semester Exam (ESE):</b>	<b>Two section – A &amp; B</b>		
	Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40Marks		

Name and Signature of Convener & Members of CBoS:



**FOUR YEARS UNDERGRADUATE PROGRAM (2024-28)**

**DEPARTMENT OF PHYSICS**

**COURSE CURRICULUM**

<b>PART – A: INTRODUCTION</b>			
Program: Bachelor in Science (Certificate/ Diploma/ Degree/ Honors)		Semester: I/ III/ V	Session: 2024-25
1	Course Code	PHVAC-01	
2	Course Title	Renewable Energy and Energy Harvesting	
3	Course Type	Value Addition Course	
4	Pre-requisite (if any)	As per Program	
5	Course Learning Outcomes (CLO)	Objective of the course is to impart students; the knowledge of renewable energy and they are expected to learn about: <ul style="list-style-type: none"> <li>➤ Energy crisis at national and international scenario.</li> <li>➤ Renewable sources of energy and their importance.</li> <li>➤ Availability of renewable energy resources in India.</li> <li>➤ Knowledge about energy harvesting technology.</li> </ul>	
6	Credit Value	02 Credits	1 Credit = 15 Hours- Learning & Observation
7	Total Marks	Maximum Marks: 50	Minimum Pass Marks: 20
<b>PART – B: CONTENT OF THE COURSE</b>			
Total No. of Teaching–learning Periods (01 Hr. per period) - 30 Periods (30 Hours)			
Unit	Topics		No. of Period
I	<b>Fossil fuels and Alternate Sources of energy:</b> Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. Limitations of non-conventional energy resources. Environmental aspect of energy, World energy status, Energy scenario in India. <b>Geo thermal Energy:</b> Geothermal Resources, Geo thermal Technologies.		07
II	<b>Solar energy:</b> Solar energy, its importance, storage of solar energy, solar pond, non-convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, sun tracking systems. <b>Hydro Energy:</b> Hydro power resources, hydro power technologies, environmental impact of hydro power sources.		08
III	<b>Biomass energy:</b> Biomass resources, Biomass conversion technology, biogas generation, factors affecting bio-digestion, working of biogas plant (with block diagram), biogas from plant waste, biomass energy programme in India, Biodiesel production from non-edible oil seeds. <b>Ocean Energy:</b> Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices.		08
IV	<b>Wind Energy harvesting:</b> Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines. grid interconnection topologies. <b>Piezoelectric Energy harvesting:</b> Introduction, Physics and characteristics of piezoelectric effect, piezoelectric materials, Piezoelectric Energy harvesting applications.		07
<b>Keywords:</b>	Fossil fuel, Renewable energy sources, Solar energy, Biomass energy, Electromagnetic Energy Harvesting, Piezoelectric Energy harvesting.		

**Signature of Convener & Members (CBoS):**

*(Handwritten signatures in blue ink)*

## PART – C: Learning Resources

### Text Books, Reference Books and Others

#### Text Books Recommended-

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
6. J. Balfour, M. Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).

#### Reference Books Recommended-

1. Non-Conventional Energy Resources by B.H. Khan
2. Renewable Energy Sources and Emerging Technologies by D.P. Kothari, K.C. Singal, and Rakesh Ranjan
3. Solar Energy: Fundamentals, Design, Modelling and Applications by G.N. Tiwari
4. Hydropower Development in India: A Sector Assessment by Pradeep Chaturvedi
5. Biomass Conversion: The Interface of Biotechnology, Chemistry and Materials Science by Samir K. Khanal, edited by B.C. Meikap and P.K. Bhattacharya
6. Ocean Energy: Technology, Environmental Impact and Renewable Energy by Pranav Kumar and T. Balaji
7. Wind Energy: Theory and Practice by S. Rao and Dr. B.B. Parulekar
8. Piezoelectric Materials and Devices: Applications in Engineering and Medical Sciences by Arun Ghosh

### Online Resources (e-books/ learning portals/ other e-resources)

1. [http://en.wikipedia.org/wiki/Renewable\\_energy](http://en.wikipedia.org/wiki/Renewable_energy)
2. [Renewable Energy Engineering: Solar, Wind And Biomass Energy Systems - Course \(nptel.ac.in\)](#)
3. [Technologies For Clean And Renewable Energy Production – NPTEL+](#)
4. [NPTEL :: Mechanical Engineering - NOC:Selection Of Nanomaterials For Energy Harvesting And Storage Application](#)
5. [Wind energy Labs : Mechanical Engineering : Amrita Vishwa Vidyapeetham Virtual Lab](#)
6. [Virtual Labs \(vlabs.ac.in\)](#)
7. <https://youtu.be/uY3x7Tycyps>

## PART – D: ASSESSMENT AND EVALUATION

### Suggested Continuous Evaluation Methods:

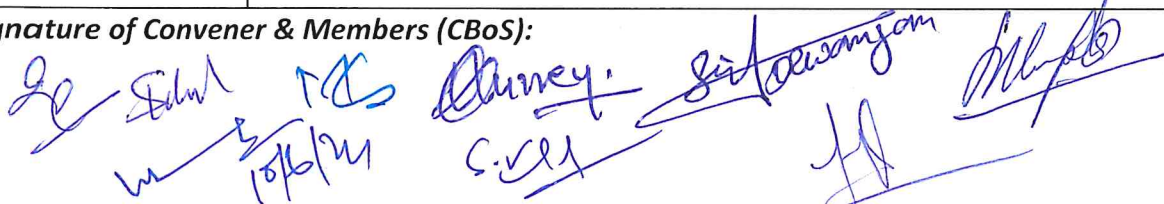
Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By course teacher)	Internal Test/ Quiz- (2):	10 + 10	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 15 Marks.
	Assignment/ Seminar+ Attendance-	05	
	Total Marks-	15	
End Semester Examination (ESE):	Two section – A & B Section A: Q1. Objective – 05 x1= 05 Mark; Q2. Short answer type- 5x2 =10Marks Section B: Descriptive answer type qts.,1 out of 2 from each unit- 4x05 =20 Marks		

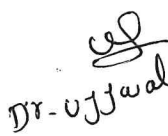
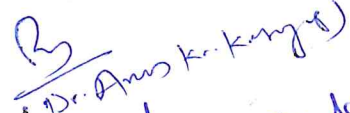
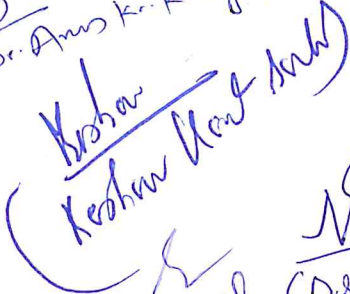
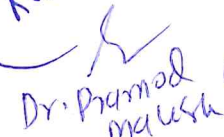
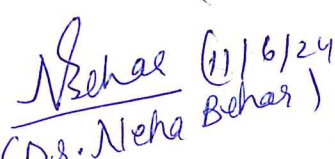
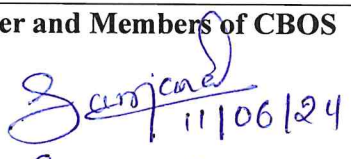
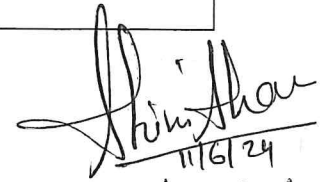
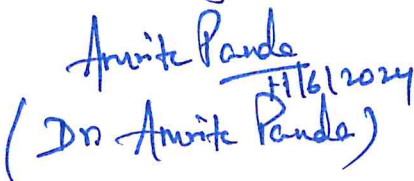
Signature of Convener & Members (CBoS):



**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)  
COURSE CURRICULUM**

PART A: INTRODUCTION			
Program: Certificate Course		Semester- I Sem	Session: 2024-25
1	Course Code	AEC 01	
2	Course Title	Environmental Studies	
3	Course Type	Ability Enhancement Course (AEC)	
4	Prerequisite (If Any)	As per requirement	
5	Course Outcome (CO)	At the end of this course, students will be able to – CO 01: relate the basic concept of the environment CO 02: explain environmental alterations CO 03: develop skills in environmental measurement CO 04: examine correction measures of the environment	
6	Credit Value	02 C	01 Credit = 15 Hrs. Teaching-Learning
7	Total Marks	Max. Marks: 50	Minimum Pass marks: 20
PART: B CONTENT OF THE COURSE			
Total No. of Teaching-Learning Periods: 30Hours/ 30Periods			
UNIT	TOPIC (Course Contents)		No. of Hours
I	<b>Basic Composition:</b> 1. Abiotic and Biotic components of the environment 2. Biodiversity—Concept, types, and measures about its protection 3. Basic concept of Bio-Geo Chemical Cycle 4. Energy Flow in an ecosystem		07
II	<b>Alterations in Environment:</b> 1. Concept and components of the pond ecosystem 2. Air pollution and measures for its control 3. Water pollution and measures for its control 4. Global warming, Climate change, and possible measures		07
III	<b>Measurements of Environmental Components</b> 1. Soil composition and methods of its analysis 2. Water analysis methods for DO, BOD, COD 3. Water analysis methods for pH, TDS, Turbidity, Salinity, and Alkalinity 4. Information about environmental factors—PM-10, PM-2.5, NO <sub>2</sub> , O <sub>3</sub>		08
IV	<b>Application Measures</b> 1. Useful microbes to control water pollution 2. Useful microbes to control soil pollution 3. Concept of Biodegradation 4. Concept of Phytoremediation		08
Key Words	Ecosystem, Pollution, Climate Change, Biodegradation		

Name and Signature of Convener and Members of CBOS

  
 Dr. Ujjwalesu  
  
 Dr. Anurag K. Kung'u  
  
 Keshav  
  
 Dr. Pramod  
  
 Dr. Neha Behar  
  
 Dr. Sanjana Bhagat  
  
 Dr. Shirani Sh  
  
 Anvite Panda  
 (Dr. Anvite Panda)

## PART-C: Learning Resources

### Text Books, Reference Books, and Others

#### Text Books Recommended –

1. Ecology and Environment, 8<sup>th</sup> Edition, P.D.Sharma, Rastogi Publication, Meerut.
2. Environmental Biology, 2<sup>nd</sup> Edition, P.D.Sharma, Rastogi Publication, Meerut.
3. Environmental Biology and Toxicology, 2<sup>nd</sup> Edition, P.D.Sharma, Rastogi Publication, Meerut.
4. Environmental Studies, 1<sup>st</sup> Edition, S.V.S.Rana, Rastogi Publication, Meerut.
5. Environmental Biotechnology, 1<sup>st</sup> Edition, S. V. S. Rana, Rastogi Publication, Meerut.

#### Online Resources–

- e-Resources / e-books and e-learning portals

#### Online Resources–

- e-Resources / e-books and e-learning portals

## PART -D: Assessment and Evaluation

### Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

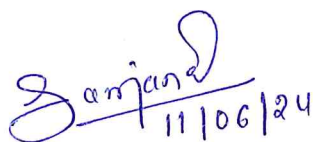
Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

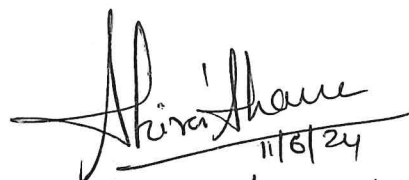
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2):	10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance -	05	
	Total Marks -	15	

End Semester Exam (ESE):	Two sections – A & B Section A: Q1. Objective – 05 x1= 05 Mark; Q2. Short answer type- 5x2 =10 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit- 4x05 =20 Marks
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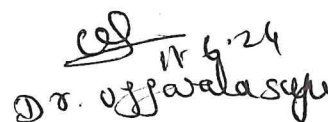
Name and Signature of Convener & Members of CBoS:

  
11/06/24

(Dr. Sanjani Bhagat)

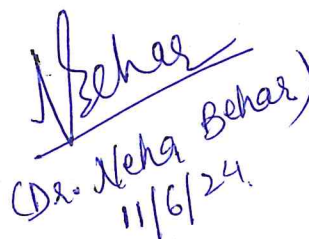
  
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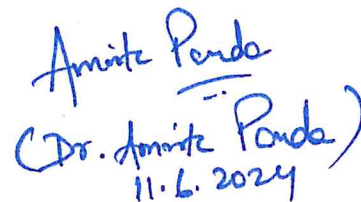
(Dr. Shivani Sharma)


  
11/6/24  
Dr. Ujjwal Singh

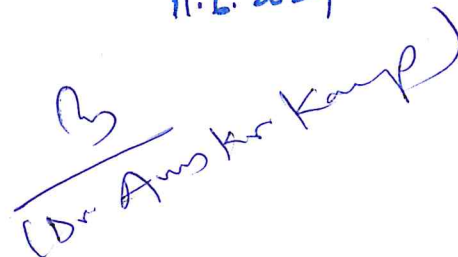
  
11/06/24

(Dr. Shubha Diwan)

  
11/6/24  
Dr. Neha Behar

  
11.6.2024  
Dr. Amite Pande

  
Dr. Pramod Kumar Mahesh

  
Dr. Anurag Kaur