

SEMESTER I

ENVIRONMENTAL STUDIES

1. Course Description

Program: BSC
Course Code: U24/EVS/AECC/101
Course Type: AECC
No. of credits: 2

Max. Hours: 30
Hours per week: 2
Max. Marks: 50

2. Course Objectives:

- To Understand the principles of ecology and environmental issues
- To acquire the skills needed and develop a sense of responsibility to actively participate in its protection and improvement

3. Course Outcomes:

On completion of the course the student will be able to:

CO 1: Gain knowledge and develop in-depth understanding of the basics of ecological principles, conservation of biodiversity, renewable energy resources and water conservation

CO 2: Enhanced analytical capability to undertake and participate in finding solutions for various environmental issues and concerns of national and global importance to achieve environmental protection and sustainable development

4. COURSE CONTENT

UNIT - I: Ecosystem, Biodiversity & Natural Resources (15 hrs.)

1. Definition, Scope & Importance of Environmental Studies
2. Structure of Ecosystem – Abiotic & Biotic Components, Ecological Pyramids
3. Definition of Biodiversity, Genetic, Species & Ecosystem Diversity, IUCN Red list, Hotspots of Biodiversity, Threats and Conservation of Biodiversity (*In situ & Ex situ*)
4. Renewable Energy Resources – Solar, Wind and Biomass
5. Water Conservation, Water Footprint, Rain Water Harvesting
6. Environmental Ethics

UNIT – II: Environmental Pollution, Global Issues & Legislation (15 hrs.)

1. Causes, Effects and Control Measures of Air and Water Pollution
2. Solid and Plastic Waste Management, Zero Waste Management
3. Global Warming & Ozone Layer Depletion, Carbon Footprint
4. Environmental Laws and Acts-Wildlife Protection Act, Forest Act, Air Act, Water Act
5. People's Participation in Environmental Protection- Silent Valley, Bishnois of Rajasthan
6. Disaster Management-Flood, Earthquake and Cyclones
7. Environmental Management
8. Role of Information Technology in Environmental Protection and Health

Field visit:

1. Visit to Solar Plant in your Locality/City
2. A Glimpse of Biodiversity in Hyderabad/ Visit to National Parks and a Walk-Through Campus
3. Visit to a Nearby Lake

5. REFERENCES:

Books:

- Text book of Environmental Studies for undergraduate courses (second edition) by Erach Bharucha
- Environmental Studies by Dr. J.P. Sharma
- Perspectives in Environmental Studies – Anubha Kaushik & C.P. Kaushik
- A text book of Environmental Studies by Dr. D. K. Asthana and Dr. Meera Asthana
- Environmental Science by Dr. Syeda Azeem Unnisa

Magazines:

- **Terra Green (a monthly digital magazine on environmental issues)**
- Down to Earth, Centre for Science &
- Environment Survey of the Environment published by The Hindu

E-Resources:

- <https://www.cseindia.org/>
- <https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf>

6. Syllabus Focus

a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/ National /Global Development Needs	Relevance
Local needs	<p>Develop a critical understanding of Environmental issues and concerns. Inculcate the environmental ethics and work for sustainable future</p> <p>Utilise the potential application of Methods of Solid Waste Management in the Waste management concerns</p> <p>Involve in community development through extension and organising programs.</p>
Regional needs	Creates awareness on pollution and threats to biodiversity in the Ecosystem
National needs	Have an over view of mitigation measures of disaster management. Explain major conservation strategies taken in India. Apply the Knowledge of role of information technology in protection of the environment.
Global needs	Environmental studies is globally relevant to monitor environmental issues and for the sustainable development. It deals with issues and challenges of environment management in the changing climate scenario.

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b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development, Entrepreneurship Development, Employability	Unit II Solid Waste Management	Demonstration of Composting, Vermicomposting and the preparation of Bio-Enzymes. Awareness on scope of green entrepreneurship and employability related to Solid waste management

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential learning	Field trips, Documentary watching, Demonstrations, Student volunteering days, Plantation drives, Clean up drives
2.	Participative Learning	Seminars, Workshops, Guest lectures, Group Discussion, Library reference, Presentations and Competitions, Demonstrations by students
3.	Problem Solving	Case Studies, Projects

8. Course Assessment Plan

a) Weightage of Marks in Internal Assessments and End Semester Examination

CO	Internal Assessments IA -40%	End Semester Examination-60%
CO1	Field Visit report/Case Study/ Poster making/ Presentations/Eco Friendly product making/Model making	Written Exam
CO2		

b) Model Question Paper- End Semester Exam

ENVIRONMENTAL STUDIES

Course Code: U24/EVS/AECC/101

Time: 1 Hour

Max. Marks: 30

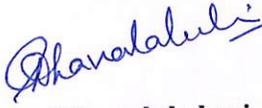
Answer any five of the following:

5X6=30

1. Define environmental studies and mention the importance of environmental studies.
2. "Biomass is an important source of energy", Discuss.
3. Explain the rooftop rainwater harvesting system with the help of a diagram.
4. Identify the reasons for water pollution in your region and suggest measures to reduce the water pollution.
5. Discover the initiatives taken by swachh cities in solid waste management.
6. Comment on "Silent Valley- A people's movement that saved a forest."
7. List out the changes you would make in your lifestyle to reduce your carbon footprint.

c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks
I	15	CO 1	3	6
II	15	CO 2	4	6

Prepared by	Checked & Verified by	Approved by
 G. Dhanalakshmi Head, Dept. of Environmental Studies	 G. Dhanalakshmi, Head, Dept. of Environmental Studies	 Dr. Uma Joseph Principal

SEMESTER II

ENVIRONMENTAL STUDIES

6. Course Description

Program: BA, BMS & BCOM

Course Code: U24/EVS/AECC/201

Course Type: AECC

No. of credits: 2

Max. Hours: 30

Hours per week: 2

Max. Marks: 50

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9. COURSE CONTENT

UNIT - I: Ecosystem, Biodiversity & Natural Resources (15 hrs.)

1. Definition, Scope & Importance of Environmental Studies
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3. Definition of Biodiversity, Genetic, Species & Ecosystem Diversity, IUCN Red list, Hotspots of Biodiversity, Threats and Conservation of Biodiversity (*In situ* & *Ex situ*)
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b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development, Entrepreneurship Development, Employability	Unit II Solid Waste Management	Demonstration of Composting, Vermicomposting and the preparation of Bio-Enzymes. Awareness on scope of green entrepreneurship and employability related to Solid waste management

7. Pedagogy

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ENVIRONMENTAL STUDIES

Course Code: U24/EVS/AECC/201

Time: 1 Hour

Max. Marks: 30

Answer any five of the following:

5X6=30

1. Define environmental studies and mention the importance of environmental studies.
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 G. Dhanalakshmi Head, Dept. of Environmental Studies	 G. Dhanalakshmi, Head, Dept. of Environmental Studies	 Dr. Uma Joseph Principal

SEMESTER – II
DATA STRUCTURES

1. Course Description**Programme: B.Sc.****Course Code: U24/CSC/DSC/201****Course Type: DISCIPLINE SPECIFIC CORE****No. of credits: 4****Max. Hours:60****Hours per week:4****Max. Marks: 100****2. Course Objectives**

- To provide the knowledge of basic data structures and their implementations
- To develop skills to apply appropriate data structures in problem solving.

3. Course Outcomes:

After the successful completion of the course, the student will be able to:

CO1: To *demonstrate* an understanding of basic data structures and solve problems of sorting, searching. (Cognitive Level 3)

CO2: *Illustrate* linear data structure such as stacks, queues and their applications (Cognitive Level 3)

CO3: To *demonstrate* operations on linear data structures – Linked Lists. (Cognitive Level 3)

CO4: To *describe* basic operations on trees and graphs and various graph traversal techniques. (Cognitive Level 2)



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4. Course Content

MODULE I: INTRODUCTION TO DATA STRUCTURES (15 hrs)

Introduction to data structures, Types of data structures, Data structure Operations. Arrays- types of Arrays, Array Traversal, Insertion, Deletion, Linear Search, Binary Search; Sorting using Non-Recursive methods- Bubble Sort, Selection Sort and Insertion Sort; Sorting using Recursive methods- Merge sort, Quick sort and Heap sort. .

MODULE II: STACKS AND QUEUES (15 hrs)

Stacks-Introduction, Stacks, stack operations, stack Implementation.
Queues- Introduction, Queues-Basic Concept, Queue Operations, Queue Implementation
Circular Queues, Double-Ended Queues.

MODULE III: LINKED LIST (15 hrs)

Linked Lists- Introduction, Linked List-Basic Concept, Linked List Implementation, Types of Linked Lists, Circular Linked List, Doubly Linked List.

MODULE IV: TREES AND GRAPHS (15 hrs)

Trees- Introduction, Basic Concept, Binary Tree, Binary Tree Representation, Binary Tree Traversal, Binary Search Tree, Tree Variants. Graphs- Basic Concept, Graph Terminology, Graph Implementation, Shortest path Algorithm, Graph Traversal.

5. References:

1. Data Structures Using C ,by E.Bala Guruswamy, McGraw Hill Education,First Edition,2017
2. Data Structures, by G.S.Baluja, Dhanpat Rai & Co. (P) Limited, First Edition
3. Data Structures & Algorithms in Java, by Robert Lafore,PearsonEducation,Second Edition.
4. Data Structures & Algorithms in Java, by Michael T.Goodrich.RobertTamassia , Wiley; 5th edition, Fifth edition



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6. Syllabus Focus

a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global	This course helps students learn different Algorithms in data Structures

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module I, II	Understanding and applying various searching, sorting techniques. Implementing stacks and queues.
SD	Module III, IV	Practical implementation of linked lists, trees and graphs.

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Group Discussion	Participative Learning Group Discussion
2.	Interactive Classroom games	Experiential Learning
3.	Problem solving	Case studies


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8. Course Assessment Plan**a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination**

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination- 60%
CO1	CIA-1 Written exam	Written Exam
CO2	CIA-1 Written exam	
CO3	CIA-2 Written Assignment	
CO4	CIA-2 Presentation	



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b) Model Question Paper- End Semester Exam**DATA STRUCTURES**

Course Code: U24/CSC/DSC/201

Max.Marks:60

Credits:4

Time: 2 hrs.

SECTION - A**I. Answer the following****4 x 10 = 40 M**

1. a) Write a program to implement selection sort.
b) Trace the following list using selection sort 23 12 35 19 41 38
OR
2. Write a program to implement merge sort.
3. Explain prefix, infix and postfix Expressions.
OR
4. a) Write the procedure for Push and Pop operation of a stack using arrays.
b) Write the procedures to insert and delete data using a queue.
5. a) Explain the advantages of doubly-linked lists.
b) Write a program to insert and display the elements of a single linked list
OR
6. Write a program to perform the linked queue operations.
7. Explain binary trees. List and explain the various tree traversals with an example.
OR
8. Explain different graph search methods with an example.

SECTION - B**II. Answer any Four****4x 5=20 M**

9. Write a program to sort the elements using bubble sort.
10. Explain doubly linked list with example.
11. Write short notes on the applications of stacks.
12. Write the node structure for a single linked list.
13. Explain Circular Queue.
14. Explain BFS with examples.



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**DATA STRUCTURES
PRACTICAL****1. Course Description****Programme: B.Sc.****Course Code: U24/CSC/DSC/201/P****Course Type: DISCIPLINE SPECIFIC CORE****No. of credits: 1****Max. Hours: 30****Hours per week: 2****Max. Marks: 50****2. Course Objective:**

To introduce the fundamental concepts of data structures through C language

3. Course Outcomes:**CO1:** To understand searching and sorting techniques using coding exercise**CO2:** Apply the principles of stacks, queues and linked lists**PRACTICAL SESSIONS**

1. Program to implement linear search.
2. Program to implement Binary search.
3. Program to implement Bubble sort.
4. Program to implement Selection sort.
5. Program to implement Insertion sort.
6. Program to implement Merge sort.
7. Program to implement Quick sort.
8. Program to implement Heap sort.
9. Program to implement Stack using arrays.
10. Program to implement Queue using arrays.
11. Program to implement Single linked list.
12. Program to implement Linked list using stack.
13. Program to implement Linked list using queue.
14. Program to implement Double linked list.
15. Program to implement Binary tree traversals.



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PRACTICAL MODEL PAPER

Course Code: U24/CSC/DSC/201/P
Credits: 1

Max Marks:50
Time: 2hrs

I. Answer any TWO

1. Write a C Program to implement Selection Sort.
2. Write a C Program to implement Stack using linked lists.
3. Write a C Program to implement Binary tree traversals.

c) Question Paper Blueprint

Module s	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
1	15	CO-1	2	10	2	5
2	15	CO-2	2	10	2	5
3	15	CO-3	2	10	1	5
4	15	CO-4	2	10	1	5

9. CO-PO Mapping

CO	PO	Cognitive Level	Class room sessions(hrs.)
1	1	3	15
2	2	3	15
3	1	3	15
4	2	2	15



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DIFFERENTIAL EQUATIONS

1. Course Description

Programme : B.Sc

Course Code : U24/MAT/DSC/201

Course Type : DSC II

No. of credits : 4

Max. Hours : 60

Hours per week : 4

Max. Marks : 100

2. Course Objectives

- To develop the ability to solve various types of differential equations using analytical methods
- To explore applications of differential equations in areas Growth and Decay, Dynamics of Tumour growth, Radioactivity and Carbon Dating, Compound Interest, Biological Growth, Epidemiology, Orthogonal Trajectories.

3. Course Outcomes

On completion of the course the student will be able to:

CO1: Classify different types of exact and non exact differential equations (**CLASSIFY**)

CO2: Discuss methods to obtain solutions for the first order but not of the first-degree differential equations and the applications of differential equations in various fields (**DISCUSS**)

CO3: Apply various methods for solving higher order linear differential equations with constant coefficients (**APPLY**)

CO4: Evaluate higher order of differential equations with non constant coefficient and Systems of Linear Differential Equations (**EVALUATE**)

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4. Course Content

MODULE I:

(15 Hrs)

DIFFERENTIAL EQUATIONS OF FIRST ORDER & FIRST DEGREE:

Introduction, Equations in which Variables are Separable, Homogeneous Differential Equations, Differential Equations reducible to Homogeneous Form, Linear Differential Equations, Differential Equations reducible to Linear Form, Exact Differential Equations, Integrating Factors, Change in variables.

Sections: - 2.1- 2.9, Pg No. 27-56, 60-62

MODULE II:

(15 Hrs)

DIFFERENTIAL EQUATIONS OF THE FIRST ORDER BUT NOT OF THE FIRST DEGREE:

Equations solvable for p, y, x, that do not contain x or y, Homogeneous in x & y, Equations of the first degree in x & y, Clairaut's Equation.

Sections: 3.1- 3.2.5, Pg. No.63-74

APPLICATIONS OF FIRST ORDER DIFFERENTIAL EQUATIONS:

Growth and Decay, Dynamics of Tumour growth, Radioactivity and Carbon Dating, Compound Interest, Biological Growth, A problem in Epidemiology, Orthogonal Trajectories

Sections: 4.1- 4.4, 4.8-4.9, 4.20, Pg. No. 75-84, 92-98, 133-140

MODULE III:

(17 Hrs)

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS:

Introduction, Solution of homogeneous linear differential equations of order n with constant coefficients, Solution of non-homogeneous linear differential equation with constant coefficients by means of polynomial operators:

1. When $Q(x) = b x^s$ and $P(D) = D - a_0, a_0 \neq 0$
2. When $Q(x) = b x^s$ and $P(D) = a_n D^n + a_{n-1} D^{n-1} + \dots + a_1 D$
3. When $Q(x) = b e^{ax}$
4. When $Q(x) = b \sin ax$ or $b \cos ax$
5. When $Q(x) = e^{ax} V$, where V is a function of x
6. When $Q(x) = b e^{ax}$ & $P(a) = 0$
7. When $Q(x) = xV$ where V is any function of x

Method of Undetermined Coefficients, Method of Variation of Parameters.

Section: - 5.1-5.5, Pg. No. 159-190, 239- 241



MODULE IV:

(13 Hrs)

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS WITH NON-CONSTANT COEFFICIENTS:

Linear differential equations with non constant coefficients, The Cauchy Euler Equations, Legendre's Linear Equation.

Sections: - 5.6-5.8, Pg No. 190– 196, 241

SYSTEMS OF LINEAR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS:

Definitions and Solution, Solution of a System of Linear Equations with Constant Coefficients, an Equivalent Triangular System, Degenerate Case, Compartment systems-Mixture Problems.

Sections: - 7.1-7.4, 7.10.1, Pg No. 311-320, 339-342, 365-366

5. References

1. Zafar Ahsan, Differential Equations & their Applications (Third Edition), Prentice Hall of India, Pvt. Ltd. New Delhi.
2. Rai Singhanian, Ordinary & Partial Differential Equations, S. Chand & Co., New Delhi.
3. Richard Bronson, Differential Equations International Edition, Schaum's Outline Series.
4. V. Venkateshwara Rao, N. Krishna Murthy, B.V.S.S. Sarma, S. Anjaneya Sastry, The Text book of B.Sc. Mathematics, Revised edition of 2014 Volume 1, S.Chand and Co Private Ltd.
5. B. Sc First Year Mathematics, Telugu Akademi



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6. Syllabus Focus

a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global	Differential equations help in predicting future behavior, optimizing processes, and solving real-world problems. Their applications range from understanding the motion of celestial bodies to modeling population growth and predicting the spread of diseases.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module I: Differential Equations	Plotting a graph using Sage Math software
Employability	Module II: Applications of first order differential equations	Modelling of real-world problems
Skill Development	Module III: Higher order linear differential equations with constant coefficients	To pursue Higher Education

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	Skill Tests
2.	Experiential Learning	Quiz
3.	Problem solving	Group Discussions, Assignments

8. Course Assessment Plan

a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination-60%
CO1	CIA- I (Written Exam)	End Semester Examination
CO2	CIA- I (Written Exam)	
CO3	CIA- II (Skill Tests)	
CO4	CIA- II (Assignments)	


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b) Model Question Paper- End Semester Exam

DIFFERENTIAL EQUATIONS

Course Code: U24/MAT/DSC/201

No. of credits: 4

Max. Marks :60M

Time: 2Hrs

SECTION -A

I. Answer the following.

4 x 10=40M

1. Solve $x dx + y dy + \frac{xy dy - y dx}{x^2 + y^2} = 0$.

OR

2. Solve $(1+x) \frac{dy}{dx} - xy = 1-x$.

3. A culture initially has N_0 number of bacteria. At $t = 1$ hr. the number of bacteria is measured to be $\left(\frac{3}{2}\right)N_0$. If the rate of growth is proportional to the number of bacteria present, determine the time necessary for the number of bacteria to triple.

OR

4. Solve $p^2 + 2p \cot x = y^2$.

5. Solve $(D^3 + 2D^2 + D)y = x^2 + e^{2x} + x$.

OR

6. Using method of variation of parameters solve $y'' + 3y' + 2y = 12e^x$

7. Solve $x^2 \left(\frac{d^2 y}{dx^2}\right) + x \frac{dy}{dx} - 4y = x^2$.

OR

8. Solve the system $Dx - Dy = t, 4Dx - 4Dy = 4t$

SECTION -B

II. Answer any FOUR:

4x5=20 M

9. Solve $\frac{dy}{dx} = (x^2 + y^2 + 1)/2xy$.

10. Solve $y(1-xy)dx - (1+xy)xdy = 0$.

11. Solve $yzdx - 2xzdy + (xy - zy^3)dz = 0$.

12. Find the particular integral of $(D^2 - 3D + 2)y = x$.

13. Solve $(D^2 - 2D + 5)y = 0$ given that $y=0$ and $\frac{dy}{dx} = 4$ when $x=0$.

14. Solve $\frac{dx}{dt} = 2e^{2t}, \frac{dy}{dx} = \frac{x-y}{t}$

DIFFERENTIAL EQUATIONS**PRACTICAL****Programme : B.Sc.****Course Code : U24/MAT/DSC/201/P****Course Type : DSC-2****No. of credits : 01****Max. Hours : 30****Hours per week: 02****Max. Marks : 50****Course Outcomes:**

- Apply various methods to solve linear differential equations with constant coefficients.
- Solve linear equations with non-constant coefficients and Systems of Linear Differential Equations.

PRACTICAL SESSIONS

1. Linear and Bernoulli Differential Equations.
2. Exact Differential Equation and Integrating Factors – I.
3. Integrating Factors-II.
4. Equations Solvable for p and y.
5. Equations Solvable for x and Clairaut's Equations.
6. Applications of First Order Differential Equations.
7. Higher Order Linear Differential Equations.
8. Method of Undetermined Coefficients and Variation of Parameters.
9. Linear Differential Equations with non- constant coefficients, Cauchy Euler Equations, Legendre's Linear equations
10. Systems of Linear Differential Equations – Applications.

**MODEL QUESTION PAPER
PRACTICAL**

Course Code: U24/MAT/DSC/201/P

Max. Marks: 30

No. Of Credits: 1

Time: 2 Hrs

I. Answer the following:

5 x 6 = 30 M

1. Solve $\frac{dy}{dx} = \frac{\sin^2 x}{1+x^3} - \frac{3x^2}{1+x^3} y$

OR

2. Solve $y \sin 2x dx - (1 + y^2 + \cos^2 x) dy = 0$

3. Solve $(3x^2 y^4 + 2xy) dx + (2x^3 y^3 - x^2) dy = 0$

OR

4. Solve $y + px = p^2 x^4$

5. Solve $xy(y - px) = x + py$ by reducing it to Clairaut's form by using the substitution $x^2 = X, y^2 = Y$

OR

6. If Rs.10,000 is invested at 6 percent per annum, find what amount has accumulated after 6 years if interest is compounded: (a) annually, (b) quarterly, and (c) continuously.

7. Find particular integral of $y'' + 3y' + 2y = 8 + 6e^x + 2\sin x$

OR

8. Solve the following differential equations by the method of variation of parameters.

$$y'' + 2y' + y = x^2 e^{-x}$$

9. Solve $(2x + 3)^2 \frac{d^2 y}{dx^2} - 2(2x + 3) \frac{dy}{dx} - 12y = 6x$.

OR

10. Solve $2 \frac{dx}{dt} - x + \frac{dy}{dt} + 4y = 1, \frac{dx}{dt} - \frac{dy}{dt} = t - 1$


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**SEMESTER –II
THERMAL PHYSICS**

1.Course Description

Programme: B.Sc.

Course Code: U20/PHY/DSC/201

Type of course: DSC 2

No. of credits: 4

Max. Hours: 60

Hours per week: 4

Max.Marks 60

2.Course Objectives

- To study fundamentals of thermodynamics.
- To study statistical behavior of many particle systems.

3. Course Outcomes

After the successful completion of the course, the student will be able to:

CO1: Compare entropy changes in a wide range of processes.

CO2: Examine the interrelationship between thermodynamic functions and ability to use such relationship to solve practical problem.

CO3: Remember the laws of thermal radiation.

CO4: Analyze in depth about statistical distribution and the basic ideas about different statistics

4.Course Content**MODULE-I****(15 Hrs)****Kinetic theory of gases:**

Introduction – Deduction of Maxwell’s law of distribution of molecular speeds, Transport Phenomena –Viscosity of gases – thermal conductivity – diffusion of gases.

Thermodynamics:

Basics of Thermodynamics- Carnot’s engine (qualitative)-Carnot’s theorem -Kelvin’s and Clausius statements – Thermodynamic scale of temperature – Entropy, physical significance – Change in entropy in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature- Entropy (T-S) diagram – Change of entropy of a perfect gas-change of entropy when ice changes into steam.

MODULE – II**(15 Hrs)****Thermodynamic potentials and Maxwell’s equations:**

Thermodynamic potentials – Derivation of Maxwell’s thermodynamic relations – Clausius-Clayperon’s equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal’s gas.

Low temperature Physics:

Joule Kelvin effect – liquefaction of gas using porous plug experiment. Joule expansion – Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression type.

MODULE – III**(15 Hrs)****Quantum theory of radiation**

Black body-Ferry's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation - Planck's law – deduction of Wein's law, Rayleigh-Jeans law, Stefan's law from Planck's law. Measurement of radiation using pyrometers – Disappearing filament optical pyrometer – experimental determination – Angstrom pyro heliometer - determination of solar constant, effective temperature of sun.

MODULE – IV**Statistical Mechanics:****(15 Hrs)**

Introduction, postulates of statistical mechanics. Phase space, concept of ensembles and some known ensembles, classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas- Maxwell- Boltzmann's velocity distribution law, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws.

5. Reference Text Books

1. Heat Thermodynamics and Statistical Physics-Brij Lal,N.subrahmanyam,P.S.Hemne
2. **Fundamentals of Physics**. Halliday/Resnick/Walker.C. *Wiley India Edition 2007*.
3. **Second Year Physics – Telugu Academy**.
4. **Modern Physics** by R. Murugesan and Kiruthiga Siva Prasath (for statistical Mechanics)*S. Chand & Co*
5. **Heat and Thermodynamics** by Mark W.Zemansky 5th edition McGraw – Hill
6. **Heat and Thermodynamics** by D.S. Mathur.

6. Syllabus Focus

- a. Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
National	Advances in this subject contribute to space exploration, satellite communications, and national security.
Global	Indispensable for driving innovation across a wide range of sectors critical for global development.

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b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module 3 &4	Hands on Practicals

7. Pedagogy

S.No	Type/Description of activity	Student Centric Methods Adopted
1.	Seminar Presentation	Participative Learning
2.	Quiz	Experiential Learning
3.	Group Discussion	Participative Learning

8. Course Assessment Plan

a. Weightage of Marks in Continuous Internal Assessments and End Semester Examination

Examination

COs	Continuous Internal Assessments – CIA (40%)	End Semester Examination (60%)
CO1	CIA-1	End Semester examination
CO2	CIA-1	
CO3	CIA-2- Assignment/ MCQ	
CO4	CIA-2 – Presentation/ Q&A	


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b. Question Paper Pattern

Course Code: U20/PHY/DSC/201

Time: 2 hours

Max Marks: 60

SECTION-A**I. Answer all Questions**

4 x 10 = 40M

1. What are transport phenomena in gases? Derive an expression for the coefficient of viscosity of a gas on the basis of kinetic theory of gases.
OR
2. What is temperature – entropy diagram? What are its uses? Derive an equation for change in entropy in case of perfect gas.
3. Define four thermodynamic potentials. Obtain Maxwell 's thermodynamic equations using these potentials.
OR
4. What is Joule- Thomson effect? Derive an expression for Joule-Thomson cooling.
5. What is a pyrometer? Describe the construction and working of an optical pyrometer.
OR
6. Describe Planck's distribution formula. How does it explain Wien's distribution law and Rayleigh-jeans law?
7. Distinguish between classical and quantum statistics. Obtain an expression for Fermi-Dirac distribution law.
OR
8. Compare the three distribution laws of Statistical Mechanics.

SECTION-B**II. Answer any FOUR**

4x5=20 M

9. What is entropy? Show that entropy increases in an irreversible cycle.
10. Explain Kelvin scale of temperature.
11. Derive Clausius-Clapeyron's equation from Maxwell's equation.
12. Explain the principle of refrigeration.
13. Compute the temperature of the sun if a body at 1000 k emits maximum energy at a wavelength $20,000 \text{ \AA}$ and if the sun emits maximum energy at a wavelength 5500 \AA ?
14. What do you mean by statistical equilibrium?

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**THERMAL PHYSICS
PRACTICAL
SEMESTER –II**

1. Course Description:

Programme : B.Sc.
Course Code : U24/PHY/DSC/201/P
Type of Course : DSC-2
No. of credits : 1

Max. Hours: 30
Hours per week: 2
Max. Marks: 50

1. Course Objectives

- Knowledge of thermodynamics to suggest solutions for thermodynamic problems.
- Apply the Laws of thermodynamics for analyzing thermodynamic processes/cycles

2. Course Outcomes:

CO1: Apply thermodynamic laws to steam processes.

CO2: Prepare the technical report on the experiments carried

1. Co-efficient of thermal conductivity of a bad conductor by Lee's method.
2. Measurement of Stefan's constant.
3. Specific heat of a liquid by applying Newton's law of cooling correction.
4. Heating efficiency of electrical kettle with varying voltages.
5. Determination of Thermo emf
6. Cooling Curve of a metallic body (Null method)
7. Resistance thermometer. To Determine temperature coefficient of resistance
8. Thermal expansion of solids
9. Study of mechanical energy to heat.
10. Determine the Specific heat of a solid (graphite rod)

3. Reference Books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes"(Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (PragatiPrakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for students.
4. "Practical Physics" R.K Shukla, AnchalSrivastava

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**THERMAL PHYSICS
PRACTICAL MODEL QUESTION PAPER
SEMESTER -II**

Course Code: ²⁴U20/PHY/DSC/201/P

**Max Time: 2 hrs
Max. Marks: 50**

Answer any ONE of the Following

1. Determine Co-efficient of thermal conductivity of a bad conductor by Lee's method.
2. Determine Stefan's constant.
3. Determine specific heat of a liquid by applying Newton's law of cooling correction.
4. Calculate Heating efficiency of electrical kettle with varying voltages.
5. Determine of Thermo emf
6. Draw cooling Curve of a metallic body (Null method)
7. Determine temp coefficient of resistance
8. Determine thermal expansion of solids
9. Study mechanical energy of heat.
10. Determine the Specific heat of a solid (graphite rod)

Prepared by Course Teacher [Name & Signature]	Checked & Verified by HoD / Programme Coordinator [Name & Signature]	Approved by the Principal
R.S. Karttikey A. Lakshmi	R.S. Karttikey R.S. Karttikey	


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