

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	Develop a critical understanding of Environmental issues and concerns. Inculcate the environmental ethics and work for sustainable future Utilise the potential application of Methods of Solid Waste Management in the Waste management concerns Involve in community development through extension and organising programs.
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.

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		

7 DEPARTMENT OF ENVIRONMENTAL STUDIES
CHAIR PERSON B.O.E in
Environmental Science
University College of Science
Osmania University
Hyderabad-500 007.

ST. FRANCIS COLLEGE FOR WOMEN, HYDERABAD
Head
Dept. of Environmental Studies
St. Francis College for Women
(Autonomous)
Begumpet, Hyderabad-16

b) Model Question Paper- End Semester Exam

ENVIRONMENTAL STUDIES

Course Code: U24/EVS/AECC/101

Time: 1 Hour

Max. Marks: 30

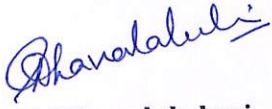
Answer any five of the following:

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

7. 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

8. 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

9. 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

10. 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	Develop a critical understanding of Environmental issues and concerns. Inculcate the environmental ethics and work for sustainable future Utilise the potential application of Methods of Solid Waste Management in the Waste management concerns Involve in community development through extension and organising programs.
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.

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/201

Time: 1 Hour

Max. Marks: 30

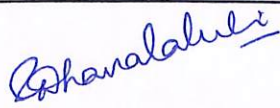
Answer any five of the following:

5X6=30

1. Define environmental studies and mention the importance of environmental studies.
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
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)



PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

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, Pearson Education, Second Edition.
4. Data Structures & Algorithms in Java, by Michael T. Goodrich, Robert Tamassia , Wiley; 5th edition, Fifth edition


PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

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


PROFESSOR
 Department of Computer Science & Engineering
 University College of Engineering (A)
 Osmania University,
 Hyderabad-500 007

Department of Computer Science

St. Francis College for Women, Hyderabad

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	


PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

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.



PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad - 500 007.

Department of Computer Science

St. Francis College for Women, Hyderabad

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.


PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

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 Mark s	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

 **PROFESSOR**
 Department of Computer Science & Engineering
 University College of Engineering (A)
 Osmania University,
 Hyderabad-500 007.

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**)

Dr. N. Kishan
Professor of Mathematics
Department of Mathematics
Osmania University
Hyderabad-500 007.

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 $Q(x) = b x^k$ and $P(D) = D - a_0$, $a_0 \neq 0$
2. When $Q(x) = b x^k$ 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



Dr. N. Kishan

Professor of Mathematics
Department of Mathematics
Osmania University
Hyderabad-500 007.

DEPARTMENT OF MATHEMATICS, ST. FRANCIS COLLEGE FOR WOMEN, HYDERABAD

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


Dr. N. Kishan
Professor of Mathematics
Department of Mathematics
Osmania University
Hyderabad-500 007.

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)	


Dr. N. Kishan
 Professor of Mathematics
 Department of Mathematics
 Osmania University
 Hyderabad-500 007.

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.

DEPARTMENT OF MATHEMATICS, ST. FRANCIS COLLEGE FOR WOMEN, HYDERABAD

Dr. N. Kishan
Professor of Mathematics
Department of Mathematics
Osmania University
Hyderabad-500 007.

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

Dr. N. Kishan
Professor of Mathematics
Department of Mathematics
Osmania University
Hyderabad-500007.

SEMESTER - II

PROBABILITY DISTRIBUTIONS

• **Course Description**

Programme: B.Sc

Max. Hours: 60

Course Code: U24/STA/DSC/201

Hours per week: 4Hrs

Course Type: DSC 2B

Max. Marks: 100

No. of credits: 4

• **Course Objectives:**

At the end of this course students are expected to be able,

- To apply standard discrete probability distribution to different situations.
- To apply standard continuous probability distribution to different situations.

Course Outcomes :

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

CO 1: **Memorize** and **apply** important discrete distributions such as Binomial, Poisson and their interrelations

CO2 : **Understand** Negative binomial, Geometric and hyper geometric distributions and ability to **identify** standard discrete probability distributions to different situations.

CO 3 : **Understand** important continuous distributions such as Uniform and Normal and also the **ability to use** and **interpret** normal probability

CO 4 : **Memorize** Exponential, Gamma, Beta and Cauchy distributions and to also **state** their relations with other distributions

4.Course Content:**MODULE-I: Discrete distributions-I****(15 HOURS)**

Uniform and Bernoulli distributions: definitions, mean, variance and simple examples. Definition and derivation of probability mass functions of Binomial distribution, Poisson distribution, properties of these distributions: median, mode, m.g.f, c.g.f, p.g.f, c.f, and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Poisson approximation to Binomial distribution.

MODULE-II : Discrete distributions-II:**(18 HOURS)**

Negative binomial, Geometric distributions: Definitions and real life applications, properties of these distributions: m.g.f, c.g.f, p.g.f, c.f and moments upto fourth order, reproductive property (wherever exists), lack of memory property for Geometric distribution. Poisson approximation to Negative binomial distribution. Hyper-geometric distribution: definition, real life applications, derivation of probability function, mean, variance. Binomial approximation to Hyper-geometric distribution.

MODULE-III : Continuous distributions- I :**(15HOURS)**

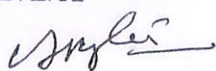
Rectangular and Normal distributions- definition, properties such as m.g.f, c.g.f, c.f and moments upto fourth order, reproductive property (wherever exists) and their real life applications.

MODULE-IV: Continuous distributions - II:**(12 HOURS)**

Exponential, Gamma distributions- definition, properties: m.g.f, c.g.f, c.f and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Beta distribution of two kinds: Definitions, mean and variance. Cauchy distribution- Definition and c.f. Pareto distribution: Mean and variance.

5. References:

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
3. V.K.Kapoor and S.C.Gupta(2010): Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi .
4. S.C.Gupta and Kapoor (2010): Fundamentals of Applied Statistics, Sultan Chand and Sons, New Delhi.
5. Sanjay Arora and Bansi Lal(2000):New mathematical Statistics: Satya Prakashan, New Delhi



Professor, Dept. of Statistics
UNIVERSITY COLLEGE OF SCIENCE
Osmania University,
HYDERABAD-07. TS.

6.Syllabus Focus**a)Relevance to Local , Regional , National and Global Development Needs**

Local /Regional/National /Global Development Needs	Relevance
Global	Discrete probability distributions find applications in various fields where outcomes are countable or finite. Coin tossing and dice rolling, bio statistics and epidemiology, queueing theory, reliability engineering, inventory management, finance and risk management, game theory. Continuous probability distributions are used in financial analysis, quality control, biometrics, reliability engineering, queueing theory, telecommunications, insurance and actuarial sciences, healthcare management, engineering.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Probability distributions	Developing proficiency in probability distribution equips individuals with valuable analytical and modelling skill that are applicable across wide range of industries including finance, machine learning & data analysis, reliability analysis and more.

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	MCQ test	Experiential learning
2.	Assignment	Experiential learning

Dr. S. S. Suresh
Professor, Dept. of Statistics
UNIVERSITY COLLEGE OF SCIENCE
Osmania University,
HYDERABAD-07. TS

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 test/Assignment	
CO4	CIA-2 MCQ test	

b) Question Paper Pattern

PROBABILITY DISTRIBUTIONS

THEORY

Course Code: U24/STA/DSC/201
Credits : 4

Max. Marks: 60
Time: 2 Hrs.

SECTION –A (Essay Questions)

I. Answer the following

4x10=40Marks

1. Derive the Cumulant generating function of Binomial Distribution. Using Cumulants find first four Central moments.

(OR)

2. Obtain the recurrence relation between the moments of Poisson Distribution . Hence Obtain Coefficient of Skewness and Kurtosis.

3. Define Negative Binomial Distribution .Show that Poisson distribution as a limiting case of Negative Binomial Distribution.

(OR)

4. Explain the situation and conditions where Hyper Geometric Distribution Occurs and give its pmf. Obtain Mean and Variance of Hyper Geometric Distribution .

5. Define Exponential distribution. State and prove lack of memory property of exponential distribution.

(OR)

6. Show that for Normal Distribution Mean=Median=Mode.

7. If X is a Gamma Variate with Parameter λ then obtain its m.g.f. Hence show that m.g.f of standard Gamma Variate tends to standard Normal Variate.

[Signature]

Professor, Dept. of Statistics
UNIVERSITY COLLEGE OF SCIENCE
Osmania University,
HYDERABAD-07. TS.

(OR)

8. Define Beta Distribution of first kind. Hence obtain its first four central moments.

SECTION-B**II. Answer any FOUR****4x5=20**

9. Define Bernoulli Distribution and find its Mean and Variance.
 10. Derive the mode of poisson distribution.
 11. State and prove lack of memory property of Geometric distribution.
 12. Define Uniform Distribution on (a,b). Find its mean and variance.
 13. Define Cauchy distribution. State and prove additive property of Cauchy distribution.
 14. Define Pareto distribution. Derive its mean and variance.

c) Question Paper Blue print

Modules	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	18	CO-2	2	10	2	5
3	15	CO-3	2	10	2	5
4	12	CO-4	2	10	2	5

SEMESTER II
PROBABILITY DISTRIBUTIONS PRACTICAL

1. Course Description

Programme : B.Sc
Course Code : U24/STA/DSC/201/P
Course Type: DSC 2B
No of Credits : 1

No of Hrs allotted: 2Hrs./Week
Max . Marks: 50

2. Course Outcomes:

1. **Apply** an appropriate distribution to discrete data.
2. **Interpret** normal, exponential and Cauchy distributions.

3. Course Content :

1. Fitting of Binomial distribution for n and $p=q=1/2$
2. Fitting of Binomial distribution –Recurrence Relation Method
3. Fitting of Poisson distribution –Direct Method
4. Fitting of Poisson distribution – Recurrence relation Method.
5. Fitting of Negative Binomial Distribution.
6. Fitting of Geometric distribution.
7. Fitting of Normal Distribution – Area Method.
8. Fitting of Normal Distribution – Ordinates Method.
9. Fitting of Exponential distribution.
10. Fitting of Cauchy distribution.

a) Question Paper Pattern

PROBABILITY DISTRIBUTIONS
PRACTICAL

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

Max. Marks: 50(39+5+6)
Time: 2 Hrs.

Answer any **THREE** questions.

3 x 13 = 39

1. The screws produced by a certain machine were checked by examining samples of 12. The following table shows the distribution of 128 samples according to the number of defective pieces recorded. Fit a Binomial distribution using recurrence relation.

No. of defective pieces	0	1	2	3	4	5	6	7	8	9	10	11	12
No. of samples	2	5	6	8	10	15	20	25	14	10	7	5	1

2. The number of ISD calls made from a telephone booth was tabulated on a day-wise basis as follows. Use the direct formula to fit a Poisson distribution.

No. of ISD calls	0	1	2	3	4	5	6	7
No. of samples	11	25	56	40	22	13	5	0

3. The waiting time X (in minutes) of a railway booking counter is exponentially distributed. The following data is obtained for 200 passengers.

Waiting time	0-5	5-10	10-15	15-20	20-25	25-30	30-35
No.of samples	2	5	6	8	10	15	20

4. Fit a normal distribution by AREAS method to the following data and find the expected frequencies.

C. I	3-6	6-9	9-12	12-15	15-18	18-21	21-24	24-27	27-30
f	4	9	23	43	57	53	36	18	7

CO mapping with PO's

CO	PO	Cognitive level
1	2	Apply
2	2	Apply

Prepared by	Checked & Verified by	Approved by
Name and Signature of the teaching faculty Ms. G. Priyanka 	Name and Signature of HoD Dr. Ch. Yuganohar 	Name and Signature of Principal 