ABSTRACT ALGEBRA

1. Course Description

Programme : B.Sc
Course Code : U24/MAT/DSC/301
Course Type : DSC III
No. of credits : 4

Max. Hours : 60
Hours per week : 4
Max. Marks : 100

2. Course Objectives

- Exposing the students to learn some basic algebraic structures like groups and rings.
- Training the students to construct the proofs of theorems in a systematic way.

3. Course Outcomes

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

CO 1: Describe the concept of Group and its related topics. **(DESCRIBE)**

CO 2: Classify the properties of special classes of groups such as cyclic and Permutation groups and Explain the proofs of Lagrange's theorem, Cayley's theorem with applications. **(DISCUSS)**

CO 3: Demonstrate normal subgroups, quotient groups, group homomorphism and their Properties. **(DEMONSTRATE)**

CO 4: Develop the concept of Rings and Ideals **(DEVELOP)**

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4. Course Content

MODULE I **(15 Hrs)**

GROUPS

Definition and Examples of Groups - Elementary properties of Groups, Finite Groups, Subgroups
Terminology and notation-Subgroup Tests- Examples of subgroups
Cyclic Groups
Properties of Cyclic Groups -The classification of subgroups of cyclic groups.

Sections- Ch.2, 3, 4 Pg No's 42-58, 60-90.

MODULE II **(15 Hrs)**

PERMUTATION GROUPS AND ISOMORPHISM

Definition and notation, Cycle notation, Properties of Permutations.
Isomorphism - Definition and Examples - Cayley's theorem, Properties of Isomorphism, Automorphism.
Cosets and Lagrange's theorem - Properties of Cosets, Lagrange's Theorem and Consequences , An Application of Cosets to Permutation Groups.

Sections- Ch. 5, 6, 7 Pg No's 93- 116, 120-136, 138-153.

MODULE III **(15 Hrs)**

NORMAL SUBGROUPS AND FACTOR GROUPS

Normal Subgroups ,Factor Groups , Applications of Factor Groups.
Group Homomorphism- Definition and Examples, Properties of Homomorphism, the First Isomorphism theorem.

Sections- Ch 9, 10 Pg No's 174-182, 188-192, 194-210

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MODULE IV:

RINGS, FIELD AND IDEALS **(15 HRS)**

Introduction to Rings- Motivation and Definition-Examples of rings, Properties of Rings-Subrings.
Integral Domains- Definition and Examples Fields, Characteristic of a Ring.
Ideals, Prime Ideal and Maximal Ideal

Sections- Ch 12, 13,14 Pg No's 227-235, 237-246, 249-259

5. References

1. Joseph A Gallian, Contemporary Abstract algebra (4th edition)
2. Bhattacharya, P.B Jain, S.K.; and Nagpaul, S.R,Basic Abstract Algebra
3. Fraleigh, J.B, A First Course in Abstract Algebra.
4. Herstein, I.N, Topics in Algebra
5. Robert B. Ash, Basic Abstract Algebra
6. I Martin Isaacs, Finite Group Theory
7. Joseph J Rotman, Advanced Modern Algebra
8. B. Sc Second Year Mathematics, Published by 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	Abstract algebra, particularly the study of groups, rings, and fields, is fundamental in modern cryptography, Computer science, number theory.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module 1	Analyze proofs of important theorems in group, cyclic groups in various areas, such as cryptography, number theory, and geometry.
Skill Development	Module 2	Understand the concept of disjoint cycles. Understand how cosets are used in proving theorems and solving problems in group theory.
Skill Development	Module 3	Explore applications of factor groups in various areas, such as algebra, geometry.
Skill Development	Module 4	Explore applications of rings, integral domains, and ideals in various areas of mathematics and beyond, such as algebraic geometry.

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7. **Pedagogy**

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Seminar/Workshops/ Presentation	Participative Learning
2.	Quiz	Experiential Learning
3.	Skill Test	Participative Learning

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
CO2	CIA-1	
CO3	CIA-2(Presentation/Seminars)	
CO4	CIA-2 (Skill Test)	

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b) Model Question Paper- End Semester Exam

ABSTRACT ALGEBRA (DSC)

Course Code: U24/MAT/DSC/301 **Max. Time : 2 Hrs**

No. Of Credits: 4 **Max. Marks: 60**

SECTION –A

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

1. a) Prove that in a group G, the identity element is unique.
   b) Show that in a group G the left and right cancellation laws hold.

OR

2. Show that every subgroup of a cyclic group is cyclic
3. Every permutation of a finite set can be written as a cycle or as a product of disjoint cycles

OR

4. State and prove Cayley's theorem.
5. State and prove Lagrange's theorem.

OR

6. a) Define group homomorphism.

   b) State and prove First isomorphism theorem.

7. a) Define ring.

   b) State and prove Subring Test.

OR

8. a) Show that a finite integral domain is a field
9. b) Find all maximal ideals in Z_{12} and Z_8

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SECTION – B

II. Answer any FOUR **4 x 5 = 20 M**

9. Let G be a group, and let a be any element of G. Then prove that $\langle a \rangle$ is a subgroup of G.
10. If H and K are subgroups of G, then show that $H \cap K$ is a subgroup of G.
11. Define permutation and find the order of the following permutation $\begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 1 & 5 & 4 & 6 & 3 \end{bmatrix}$.
12. Prove that for every integer a and every prime p , $a^p \bmod p = a \bmod p$.
13. Let a, b belong to a ring R. Then show that :

    i) $a0 = 0a = 0$ ii) $a(-b) = -a(b) = -(ab)$

14. Show that the characteristic of an integral domain is 0 or prime.

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ABSTRACT ALGEBRA

PRACTICAL

Programme	**: B.Sc.**	**Max. Hours**	**: 30**
Course Code	**: U24/MAT/DSC/301/P**	**Hours per week**	**: 02**
Course Type	**: DSC III**	**Max. Marks**	**: 50**
No. of credits	**: 1**		

Course Outcomes:

- Identify the algebraic structures, groups, cyclic groups, permutation groups, normal subgroups, rings, fields.
- Apply Cayley's theorem and Lagrange's theorem.

PRACTICAL SESSIONS

1. Groups
2. Subgroups
3. Cyclic Groups
4. Permutations Groups
5. Isomorphism and Cayley's Theorem.
6. Cosets and Lagrange's Theorem.
7. Normal Subgroups and Factor Groups.
8. Group Homomorphisms
9. Rings and Subrings.
10. Integral Domains and Fields.

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CBCS 2024 ABSTRACT ALGEBRA

MODEL QUESTION PAPER

PRACTICAL

Course Code: U24/MAT/DSC/301/P **Max. Marks : 30**

No. Of Credits: 1 **Time: 2 Hrs**

I. Answer any SIX **6 x 5 = 30 M**

1. Prove that the set G = {0, 1, 2, 3, 4, 5} is an abelian group under addition modulo 6.
2. Show that the set $Ha = \{ x \in G / xa = ax \}$ is a subgroup of a G where a is a fixed element of G.
3. Determine the subgroups , generators and lattice diagram of Z_{12}.
4. Consider the three permutations in S_6

$$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 1 & 4 & 5 & 6 & 2 \end{pmatrix}$$

$$\mu = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 5 & 2 & 4 & 3 & 1 & 6 \end{pmatrix}$$

$$\tau = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 4 & 1 & 3 & 6 & 5 \end{pmatrix}$$

Compute a) $\sigma^2\mu$ b) $\tau(\sigma^{-1})^2$

5. Let $G = \{ (1), (1\ 3\ 2), (4\ 5\ 6)(7\ 8), (1\ 3\ 2)(4\ 6\ 5), (1\ 2\ 3)(4\ 5\ 6), (1\ 2\ 3)(4\ 5\ 6)(7\ 8) \}$ then find the orbit and stabilizer of 1,2,4,7
6. Prove that the mapping $\emptyset : R^* \to R^*$ under multiplication defined by (i) $\emptyset(x) = |x|$ (ii) $\emptyset(x) = x$ are homomorphisms. Determine its kernel.
7. Prove that $S_1 = \{0,3\}, S_2 = \{0,2,4\}$ are subrings of $Z_6 = \{0,1,2,3,4,5\}$ with respect to addition and multiplication of residue classes modulo 6.
8. Solve $x^2 - 5x + 6 = 0$ and $x^3 - 2x^2 - 3x = 0$ in Z_{12}.

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SEMESTER - III

GRAPH THEORY

1. Course Description

Programme : B. Sc **Max. Hours : 30**

Course Code : U24/MAT/SEC/301 **Hours per week: 2**

Type of course : SEC I **Max. Marks : 50**

No. of Credits : 2

2. Course Objectives:

- To thoroughly describe the use of graph theory in resolving minimal spanning tree and shortest path problems..

3. Course Outcome:

CO 1: Explain the basic concepts of graph theory. **(EXPLAIN)**

CO 2: Apply the concept of tree graph to evaluate spanning and minimal spanning trees. **(APPLY)**

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4. **Course Content:**

MODULE I: **(15 HRS)**

GRAPHS

Introduction, Basic Terminology, Multigraphs and weighted Graphs, Paths and Circuits, Shortest Paths in weighted graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits

Sections: Ch 5: 5.1 - 5.7, Pg. No's 37 - 159, 174 - 186

MODULE II: **(15 HRS)**

PLANAR GRAPHS, TREES AND CUT SETS

Planar Graphs, Tress, Rooted Trees, Spanning Trees and Cut-Sets, Minimum Spanning Trees.

Sections : Ch 5 – 5.10, Pg. No's 168 - 173, 174 - 186.
Ch-6 - 6.1, 6.2, 6.6, 6.7, Pg. No's 187 - 194, 205 – 213, 220 - 229.

5. **Reference Books:**

1. C.L. Liu, Elements of Discrete Mathematics, published by Tata McGraw- Hill, 2nd edition, 2000.
2. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill 4th Edition 2001.

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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	Graph theory has numerous global applications across various domains like communication networks, biology and medicine, chemistry and computer science and the versatility of graph theory makes it a fundamental tool in solving complex problems across diverse fields.

7. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module 1: Graphs Module 2: Planar Graphs, Trees and Cut Sets:	Using Geogebra software

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8. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

Formative Assessments – FA (50%)	Summative Assessments – SA (50%)
CIA- 20 Marks	End Semester Exam

b) Question Paper Pattern

GRAPH THEORY

THEORY

Course Code : U24/MAT/SEC/301 **Max. Marks : 30M**

No. Of Credits: 2 **Max. Time : 1 Hour**

SECTION –A

I. Answer any FIVE of the following. **5 x 6 = 30M**

1) (a) Let G = (V , E) be an undirected graph with m edges. Then $2m = \sum_{v \in V} deg(v)$.
   (b) Define complete bipartite graph. Draw $K_{3,2}$.
2) Define Hamilton path and circuit. Determine Hamilton circuit for the following graphsG_1, G_2 *and* G_3 .

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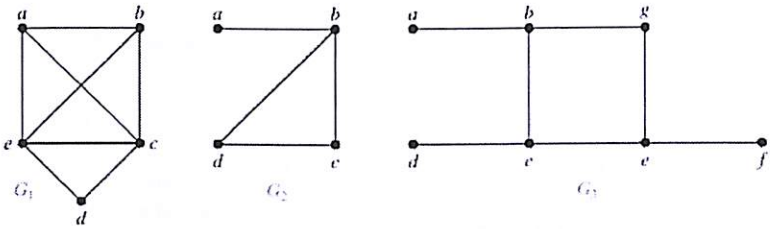

3) Find the length of the shortest path between the vertices a and z using Dijkstra's Algorithm.

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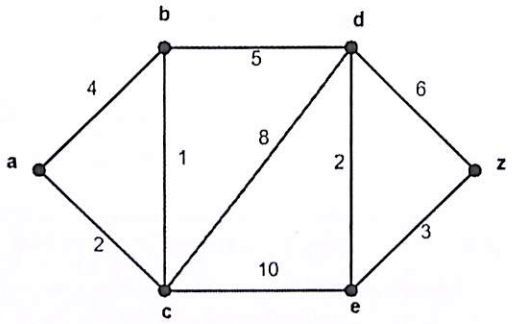
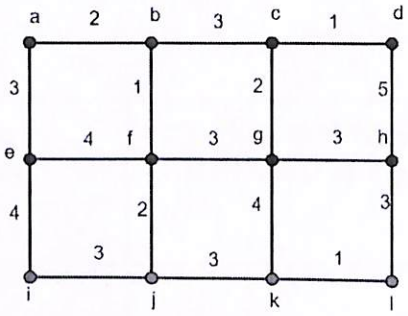
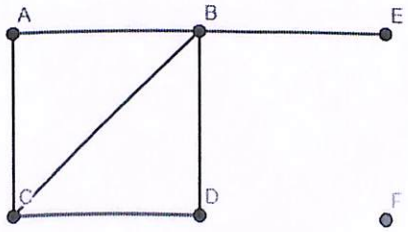


4) State and prove Euler's Formula.
5) Show that a tree with 'n' vertices has' n-1' edges.
6) Find the minimal spanning from the graph.



7) Find the number of vertices , the number of edges and the degree of each vertex in the given undirected graph .



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SEMESTER-III

PROGRAMMING IN JAVA

1. Course Description

Programme: B.Sc. **Max. Hours: 60**

Course Code: U24/CSC/DSC/301 **Hours per week: 4**

Type of course: DISCIPLINE SPECIFIC CORE **Max. Marks: 100**

No. of credits: 4

2. Course Objectives

- To introduce the object-oriented programming concepts and apply them in solving problems.
- To apply Object Oriented principles like inheritance, polymorphism to develop programs.

3. Course Outcomes

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

CO1: ***Illustrate*** an integrated development environment to write, compile, run, and test simple object- oriented Java programs. (Cognitive Level 3)

CO2: ***Explain*** concept of classes, objects, members of a class and relationships among them needed for a specific problem (Cognitive Level 2)

CO3: ***Demonstrate*** the concepts of polymorphism and inheritance. (Cognitive Level 3)

CO4: ***Define*** the concept of Exceptional Handling in JAVA (Cognitive Level 1)

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4. Course Content

MODULE I: PROCEDURAL ORIENTED PROGRAMMING (15 hrs)

Introduction to Java- Introduction to Java, Identifiers, Variables, Assignment Statements, Assignment Expressions, Constants, Data types and Operations, Console Input using Scanner class, Selections, Looping, Arrays.

MODULE II: OBJECT ORIENTED PROGRAMMING (15 hrs)

Objects and classes-Introduction, Defining classes for Objects, Constructing Objects Using Constructors, Static Variables, Constants and Methods, Visibility Modifiers, Data Field Encapsulation, Passing Objects to Methods; The this Reference, Class Abstraction and Encapsulation.

MODULE III: INHERITANCE AND POLYMORPHISM (15 hrs)

Inheritance and polymorphism-Introduction, Super classes and Subclasses, Types of Inheritance, Using the super Keyword, Overriding Methods, Overriding vs. Overloading, Polymorphism, Static vs. Dynamic Binding, Preventing Extending and Overriding -Final Methods; Abstract Classes and Interfaces.

MODULE IV: EXCEPTION HANDLING (15 hrs)

Exception Handling-Introduction, Exception-Handling Overview, Exception-Handling Advantages, Exception Types, Declaring Exceptions, Throwing Exceptions, Catching Exceptions, Getting information from Exceptions, Object Class, String Class, Array Class, Command-Line Arguments.

5. References

1. Programming with Java, by BalaguruSamy,3rd Edition,2007
2. Liang, Y. Daniel. Introduction to JAVA Programming (7th Edition). Pearson Education,2008.
3. An Introduction to Object-Oriented Programming with Java, by C. Thomas Wu,2009.

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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 DEVELOPMENT	Java is a high-level, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module -1,2	Solving real world problems using OOP techniques.
EMP	Module 1,2,3,4	Solve problems using JAVA Framework and I/O classes.

7. Pedagogy

S. No	Student Centric Methods Adopted	Type/Description of Activity
1.	Participative Learning	Seminar Presentation
2.	Experiential Learning	Quiz
3.	Participative Learning	Group Discussion
4	Problem solving	Code Debugging

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8. Course Assessment Plan

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

COs	Continuous Internal Assessments – CIA (40%)	End Semester Examination (60%)
CO1	CIA 1 Written Test	Written Exam
CO2	CIA 1 Written Test	
CO3	CIA-2 Skill Test	
CO4	CIA-3 Assignment	

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b. Question Paper Pattern

PROGRAMMING IN JAVA

Course Code: U24/CSC/DSC/301 **Time: 2 hrs**

Credits:4 **Max Marks:60**

SECTION - A

I. Answer the following: **4 x 10 = 40 M**

1. Explain the data types that are supported in Java?

OR

2. Discuss various loop statements available in Java? Show their syntax.
3. Define a constructor. Explain the various types of constructors with an example.

OR

4. How static methods can be defined and accessed. Explain with an example.
5. Write a short note on inheritance. Write a program to demonstrate inheritance.

OR

6. Define the: abstract classes & interfaces. What are the similarities and differences between abstract classes and interfaces?
7. Define Exception. Explain the following terms with respect to exception handling. i) try ii) catch iii) throw iv) finally.

OR

8.a) What is command line argument in java

b) Write a program to convert lower case string to uppercase.

SECTION – B

Answer any FOUR **4 x 5 = 20 M**

9. Write a program to search a number in an array.
10. Write a program to demonstrate constructors.
11. Explain class abstraction and class encapsulation with appropriate examples.
12. Explain the differences between method overloading and method overriding
13. Explain types of Access Modifiers.
14. What is the purpose of declaring exceptions? How do you declare an exception? Give an example.

PROGRAMMING IN JAVA
PRACTICAL

1. Course Description

Programme: B.Sc. **Max. Hours: 30**

Course Code: U24/CSC/DSC/301/P **Hours per week: 2**

Type of course: DISCIPLINE SPECIFIC CORE **Max. Marks: 50**

No. of credits: 1

2. Course Objective:

1. To write an Object-Oriented computer program to solve specified problems.
2. To apply Object Oriented principles like inheritance, polymorphism to develop programs.

3. Course Outcomes:

CO1: ***Illustrate*** an integrated development environment to write, compile, run Object- Oriented Java programs.

CO2: ***Demonstrate*** the concepts of polymorphism and inheritance, error handling techniques in solving problems.

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PRACTICAL SESSIONS

1. Basic Programs using arithmetic operators, logical & relational operators
2. Programs on Conditional statements
3. Programs on Looping
4. Programs on Arrays
5. Implementing Classes and methods
6. Constructors and constructor overloading (default, parameterized)
7. Method overloading,
8. Passing Objects as parameters to methods
9. Programs using Static member data and static methods, this keyword
10. Programs on Visibility Modifiers
11. Single inheritance and Multilevel inheritance (using super keyword)
12. Program to perform String operations
13. Program to perform methods of Array class
14. Program on Abstract Classes and Interfaces
15. Programs on Exception Handling- Declaring, Throwing, Catching Exceptions, getting information from Exceptions, finally Block

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PROGRAMMING IN JAVA

MODEL QUESTION PAPER

Course Code: U24/CSC/DSC/301/P **Max. Marks: 50**

Credits:1 **Max. Time: 2 hrs**

Answer any TWO

1. Write a java program to implement method overriding.
2. Write a java program to illustrate usage of try/catch with the finally clause.
3. Write a java program to implement Multilevel inheritance

c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section A (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

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SEMESTER III
STATISTICAL ANALYSIS USING MS-EXCEL

1. Course Description

Programme: B.Sc

Max Hours: 30

Course Code: U24/STA/SEC/301

Hours per week: 2

Course Type: SEC -1

Max Marks: 50

No. of Credits : 2

2. Course Objectives

- To provide students with the knowledge and skills necessary to effectively utilize MS-EXCEL software for statistical analysis.

3. Course Outcomes

On completion of the course the student will be able to

CO1: **APPLY** fundamental statistical concepts such as measures of central tendency, variability, probability distributions to datasets using MS-EXCEL..

CO2: **UNDERSTAND** and **APPLY** graphical techniques for data visualization in EXCEL , including histograms, scatterplots, boxplots, and bar charts.

4. Course Content:

MODULE – I: Basics of EXCEL and Descriptive Statistics **(15 HOURS)**

Basics of MS-EXCEL – data entry- functions in EXCEL.
Diagrammatic Representation(Bar, Pie, stem & leaf and box plot) ,Graphic Representation of frequency distribution(Histogram , Frequency curve , ogive curves)
Descriptive statistics : Computation of measures of central tendency and dispersion.

MODULE – II: **(15 HOURS)**
Probability distributions: Binomial,Poisson,Normal,Exponential and Cauchy distributions.
Generation of Random Numbers: Uniform, Poisson, Exponential and Normal.
Correlation(Karl Pearson's coefficient of correlation, Rank Correlation) , Fitting of a straight line, parabola and exponential curve. Simple regression analysis(X on Y , Y on X).

5. References:

1. **K.V.S. Sarma: Statistics made simple: do it yourself on PC**
2. Mastering Statistical Analysis with EXCEL by Bala subramaniyan Thyagarajan, Publisher: Otolaryngology online
3. Data Analysis with EXCEL by Nigam Manisha, BPB Publications

6.Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	Statistical Analysis using MS EXCEL equips the students with the knowledge and skills necessary to conduct statistical analysis using the MS EXCEL software, thereby

	enhancing their analytical capabilities and decision-making skills.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Data Visualization,fitting probability distributions and evaluation of relationships between data points.	Using MS-EXCEL software

7. Course Assessment Plan

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

Continuous Internal Assessments CIA - 40%	End Semester Examination-60%
CIA- 20 Marks Assignment/Problem solving	Written Exam

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b)Question Paper Pattern

STATISTICAL ANALYSIS USING MS-EXCEL

Course Code: U24/STA/SEC/301 **Max. Marks: 30**
Credits : 2 **Time: 1 Hr.**

Answer any FIVE questions out of SIX. **5X6=30M**

1. (i)The following data relates to annual profits(Rs '000) of 50 companies.

28 35 61 29 36 48 57 67 69 50 48 40 47 42 41 37 51 62 63 33 31 32 35 40 38 37
60 51 54 56 37 46 42 38 61 59 58 44 39 57 38 44 45 47 38 44 47 45 41 64

(a) Find mean,mode, variance and range using EXCEL .

(b) Calculate lower and upper quartiles, P_{38} , P_{67} and P_{87} using EXCEL.

(ii) The data in following table give death rates (per 100,000 Population) for 10 leading causes in 2000. Construct a pie diagram.

Cause	Death rate
Accidents and Adverse Effects	34.5
Chronic Liver Disease and Cirrhosis	9.7
Chronic Obstructive Lung Diseases	42.3
Cancer	199.4
Diabetes Mellitus	23.9
Heart Disease	268.0
Kidney Disease	9.7
Pneumonia and Influenza	35.1

Stroke	58.5
Suicide	10.8

2 (i) Population in mid of 2006 of six western European countries with their break-up of age is given below.

Westren European countries	<15 years age	15-65 years age	>65 years age
Austria	1.3	5.6	1.3
Belgium	1.9	6.7	1.8
France	11.4	38.8	9.6
Germany	12.4	56.2	14.0
Netherlands	3.1	10.8	2.3
Switzerland	1.2	4.9	1.2

Construct a sub divided bar diagram.

(ii) The following are the closing prices of some securities that a mutual fund holds on a certain day:

10.25	5.31	11.25	13.13	18.00	32.56	37.06	39.00
43.25	45.00	40.06	28.56	22.75	51.50	47.00	53.50
32.00	25.44	22.50	30.00	24.75	53.37	51.38	26.00
53.50	29.87	32.00	28.87	42.19	37.50	30.44	41.37

Construct stem and leaf and box plot .

3. The frequency distribution of wages in a certain factory is as follows:

Wages(Rs.)	250-259	260-269	270-279	280-289	290-299	300-309	310-319
No. of employees	10	18	27	20	15	8	2

Construct frequency polygon and ogives .

4.Fit a straight line trend to the following data .

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Value	342	350	361	375	392	351	340	320	312	308

5. The following is the data pertaining to the production and export of sugar in lakh tonnes in India from 1991-2002.

Production	37.4	31.1	38.7	39.35	47.9	42.6	48.4	64.6	58.4	38.6	51.4	84
Export	3.90	1.33	1.1	4.39	9.41	9.67	3.41	2.51	8.62	9.9	6.64	6.50

Calculate correlation coefficient and regression lines between production and export.

6. (i)Generate 50 Uniform random numbers in the interval (3,5)

(ii) The following data pertains to the number of accidents that occurred in factories. Fit a Poisson distribution and find the expected frequencies, using the recurrence relation.

No.of accidents	0	1	2	3	4	5	6
No.of factories	143	90	42	12	9	3	1

c) Question Paper Blueprint

Modules	**Hours Allotted in the Syllabus**	**COs Addressed**	**Section A (No. of Questions)**	**Total Marks**
1	15	CO-1	3	15
2	15	CO-2	3	15

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Prepared by	Checked &Verified by	Approved by
Name and Signature of the teaching faculty Dr. Ch. Yugandhar	**Name and Signature of HoD** Dr. Ch. Yugandhar	**Name and Signature of Principal**

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SEMESTER - III

STATISTICAL METHODS

- **Course Description**

Programme: B.Sc | Max. Hours: 60

Course Code: U24/STA/DSC/301 | Hours per week:4 Hrs

Course Type:DSC 3B | Max. Marks: 100

No. of credits: 4

- **Course Objectives:**

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

- To find the association between attributes and to find the correlation between two variables and form regression lines.
- To understand the concepts of sampling and to estimate the parameters using various methods.
- To compute various mortality and fertility rates.

3. **Course Outcomes :**

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

CO 1: **Memorize** the concept of attributes.

CO2 : To **understand** and **apply** the relationship between two quantitative variables through simple linear correlation and regression

CO 3 : To **understand** the relationship between sample statistics and population parameters.

CO 4 : To **Memorize** Birth and Death rates and to **apply** reproduction rates for population growth

4. Course Content:

MODULE- I: Theory of Attributes & Principle of Least squares **(15 HOURS)**

Analysis of categorical data: Definition of attributes. Independence, association of attributes, various measures of association (Yule's) for 2 –way data and coefficient of contingency (Pearson and Tcheprow's) and coefficient of colligation. Bivariate data, Scattered diagram, Principle of least squares, fitting of a straight line, quadratic, exponential and power curves.

MODULE- II: Correlation and Regression **(15 HOURS)**

Definition, Types of correlation, Methods of Studying Correlation Scattered diagram, Product moment correlation coefficient and its properties. Computation of correlation coefficient for grouped data, Spearman's Rank correlation coefficient and its properties, Correlation ratio. Partial and multiple correlation coefficients (only for three variables) .Simple linear regression, lines of regression, properties of regression coefficients, Correlation verses Regression.

MODULE- III: Theory of Estimation-I **(15 HOURS)**

Concepts of population, parameter, random sample, statistic, sampling distribution and standard error. Standard error of sample mean(s) and sample proportion(s). Exact sampling distributions- statement and properties of χ^2, t and F distributions and their interrelationships. ~~Independence of sample mean and variance in random sampling from normal distributions.~~

Point estimation of a parameter, concept of bias and mean square error of an estimate. Criteria of a good estimator- consistency, unbiasedness, efficiency and sufficiency with examples.

MODULE- IV: Theory of Estimation-II **(15 HOURS)**

Statement of Neyman's Factorization theorem, derivations of sufficient statistics in case of Binomial, Poisson, Normal and Exponential (one parameter only) distributions. Estimation by the method of moments, Maximum likelihood estimation (MLE), statements of asymptotic properties of MLE. Concept of interval estimation. Confidence intervals of parameters of normal population by pivot method.

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 Statisticswith 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 V.K. Kapoor (2008): Fundamentals of Applied Statistics, 4th Ed. Sultan Chand and Sons.

5. Hoel P.G: Introduction to mathematical Statistics(1962), Asia Publishing house.

6.Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	The theory of attributes, correlation, and regression are powerful statistical concepts with diverse applications across various fields, including quality control, reliability engineering, finance, healthcare research, market research, and marketing analytics. These statistical techniques provide valuable tools for analysing data, identifying relationships between variables, making predictions, and informing decision-making processes in both academic and contexts.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Correlation and Regression	Correlation and Regression analysis offers numerous skill opportunities across various fields including model diagnostics & validation, predicitive modelling, Time series analysis, Econometrics and financial modelling , Data visualization.
SD	Theory of estimation	Proficiency in estimation equips individuals with valuable analytical and quantitative fields including statistics, data science, economics, finance , engineering and environmental sciences.

7. Pedagogy

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

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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 test/Assignment	
CO4	CIA-2 MCQ test	

b)Question Paper Pattern

STATISTICAL METHODS

THEORY

Course Code: U24/STA/DSC/301 **Max. Marks: 60**
Credits : 4 **Time: 2 Hrs.**

SECTION –A (Essay Questions)

I. Answer the following **4x10=40Marks**

1. (i)Define Yule's coefficient of association and the coefficient of colligation and establish relation between them.

   (ii) Define consistency of data. Explain the conditions of consistency.

   OR

2. Explain the Principle of Least Squares? Derive the normal equations for fitting a straight line?
3. Derive the formula for Spearman's Rank correlation Coefficient?

   OR

4. Given the two lines of regression $4x-5y+33 = 0$ and $20x - 9y - 107=0$ .The Variance of X is 9. Find (i) mean value of X (ii) Standard deviation of Y (iii) correlation coefficient.
5. A sample X1, X2,… ,Xn of size n is drawn from $N(\mu,\sigma^2)$. Show that $\bar{X}$ is unbiased and consistent.

   OR

6. State Fisher's Neyman Factorization theorem? Find the sufficient statistic for parameter of poisson distribution.
7. Explain about estimation by method of moments. If X~B (n, p), derive an estimate for p by the method of moments.

   OR

8. Define t-distribution.? State its properties and applications?

SECTION-B

II. Answer any FOUR of the following **4x5=20M**

9. Explain the criterion for independence of Attributes.
10. Define Dichotomy, Classes and class frequencies .
11. Show that correlation coefficient is independent of change of origin and scale?
12. Explain Scatter diagram.
13. Define Unbiasedness and Consistency.
14. Define chi square distribution. What are the applications of Chi-square distribution?

c)Question Paper Blueprint

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	15	CO-2	2	10	2	5
3	15	CO-3	2	10	2	5
4	15	CO-4	2	10	2	5

SEMESTER III
STATISTICAL METHODS PRACTICAL

1. Course Description

Programme : B.Sc — **No of Hrs alloted: 2Hrs./Week**
Course Code :U24/STA/DSC/301/P — **Max . Marks: 50**
Course Type: DSC-3B
No of Credits : 1

2. Course Outcomes:

1. **Apply** the concept of curve fitting and random number generation .
2. **Demonstrate** the association between variables and **implement** the formation of regression lines and computation of various types of correlation coefficients.

3. Course Content :

1. Generation of random samples from Uniform (0,1), Uniform (a ,b), Exponential Distributions, Normal and Poisson distributions.
2. Fitting of straight line and parabola by the method of least squares.
3. Fitting of power curve of the type $Y= ax^b$ and exponential curves of the type $Y= ab^x$, $Y= ae^{bx}$ by the method of least squares.
4. Computation of Yule's coefficient of association, Pearson's, Tcheprows coefficient of contingency.
5. Computation of correlation coefficient, forming regression lines for ungrouped data.
6. Computation of correlation coefficient, forming regression lines for grouped data.
7. Computation of Multiple and Partial correlation coefficients for 3 variables only.
8. Computation of correlation ratio.

a) Question Paper Pattern

STATISTICAL METHODS

PRACTICAL

Course Code: U24/STA/DSC/301/P
Credits : 1

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

Answer any THREE questions. **3X13=39 Marks**

1. The age in years of fourteen young couples is given below:

Husband(X)	21	25	26	24	22	30	19	24	28	32	31	29	21	18
Wife(Y)	19	20	24	21	21	24	18	22	19	30	27	26	19	18

(i) Calculate correlation coefficient between the age of husband and wife.

(ii) Find the regression lines of X on Y and Y on X.

(iii) Estimate the age of wife when the age of husband is 23 years.

2. (a) A survey study of 366 students about the performance of matured and fresh certificate holder students admitted in first year of the Arts faculty yielded the following information.

	Performance	
Type of student	Good	Poor
Matured students	98	74
Fresh students	94	100

Find the extent of association between maturedness and performance by (i) Yule's coefficient and (ii) Coefficient of colligation.

(b) Generate 10 exponential random numbers with parameter $\theta=5$

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3.(a) Calculate the Tcheprow's coefficient of contingency from the following data:

Social status	Intelligence		
	Dull	Average	Brilliant
Lower middle	22	35	23
Middle	38	70	32
Upper middle	60	20	20

(b) Fit a straight line for the following data.

Years	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sales in crores	88	40	49	45	46	47	52	55	50	53	56

4. Calculate the correlation ratio of X on Y and Y on X for the following data.

Y / X	10	15	20	25	30
5	-	-	-	4	3
7	-	-	18	36	9
9	-	12	15	36	3
11	7	12	18	4	-

4. CO mapping with PO's

CO	PO	Cognitive level
1	2	Apply
2	2	Apply

SEMESTER-III

WEB DESIGNING

1. Course Description:

Programme: B.Sc. **Max. Hours: 30**

Course Code: U24/CSC/SEC/301 **Hours per week: 2**

Type of course: SKILL ENHANCEMENT COURSE **Max. Marks: 50**

No. of Credits: 2

2. Course Objective:

- To equip the students with skills required for designing the front end of web applications and understand principles of creating an effective web page.

3. Course Outcomes:

This SEC paper will help students to enhance their overall skills and to

- **CO1**: ***Illustrate*** skills in developing simple HTML webpages. (Cognitive Level 3)
- **CO2**: ***Design*** and development an effective website using HTML Forms and CSS. (Cognitive Level 6)

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4. Course Content:

MODULE I: INTRODUCTION TO XHTML **(15 Hrs)**

Introduction to the internet, WWW, Web browsers, web servers, Uniform Resource Locator, Multipurpose Internet Mail Extensions, The Hypertext Transfer Protocol, Introduction to XHTML, Tags for: Basic Text Markup, images, hyperlinks, ordered and unordered Lists, tables, nested tables.

MODULE II: FORMS AND CASCADING STYLE SHEETS **(15 Hrs)**

XHTML Forms – Text field, password, dropdown lists, radio buttons, check boxes. Cascading Style Sheet - Introduction, Levels of style sheets, style Specification Formats, selector forms, Property Value Forms, Font Properties, List Properties and the Box Model.

5. References:

1. Programming the World Wide Web" by Robert W.Sebesta, , Pearson Edition.
2. "HTML Black Book", by Holzner, DreamTech Press.
3. "Internet & World Wide Web: How to program" by Deitel, P. J., Deitel, H. M., & Deitel, Pearson,Fourth 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	The ability to analyse, identify and define the technology required to build and implement a website

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Modules I ,II	Mini Project

7. Course Assessment Plan:

a) Weightage of Marks in Formative and Summative Assessments

Formative Assessment - FA (50%)	Summative Assessment - SA (50%)
CIA-20 marks Mini project/Assignment/ Problem solving/Case studies.	End Semester exam-30 Marks.

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b) Question Paper Pattern

MODEL QUESTION PAPER

PRACTICAL

Course code: U24/CSC/SEC/301
Credits: 2

Max Time: 1Hr
Max. Marks: 30M

Answer the following.

1. Design a web page using targeted frames depicting the courses offered in the college.
2. Create a web page, for the menu items in the restaurant using embedded style sheets.

Prepared by	Checked & verified by	Approved by
Ms. D.B.Rekha **Teaching Faculty**	**Ms. D.Sowjenya** **HOD**	**Dr. Uma Joseph** **Principal**

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