॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA
Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'B++' grade

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विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरण २०२० नुसार पदवी द्वितीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२५–२६ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक २७ मे २०२५ रोजी संपन्न झालेल्या मा. विद्यापरिषद बैठकीतील विषय क्रमांक १६/६१–२०२५ च्या ठरावानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील राष्ट्रीय शैक्षणिक धोरण–२०२० नुसारचे पदवी द्वितीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२५–२६ पासून लागू करण्यास मा. विद्यापरिषदेने मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील बी. एस्सी द्वितीय वर्षाचे खालील विषयाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२५–२६ पासून लागू करण्यात येत आहेत.

01	B.Sc. Computer Management (Single Major)
02	B.Sc. Information Technology (Single Major)
03	B.Sc. Software Engineering (Single Major)
04	B.Sc. Computer Network Technology (Single Major)
05	B.Sc. Computer Science (Single Major)
06	B.Sc. Artificial Intelligence & Machine Learning (Single Major)
07	B.Sc. BCA (Single Major)
08	B.Sc. Computer Maintenance
09	B.Sc. Computer Science
10	B.Sc. Information Technology
11	B. Sc. Computer Application
12	B. Sc. Software Development
13	B. Sc. Data Science
14	B. Sc. Computer Science (with data Science specialization)

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शै–१/एनइपी/विवर्त्रविपदवी/२०२५–२६/१२६
दिनांक १२.०६.२०२५

सहाय्यक कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत : माहितीस्तव तथा कार्यवाहीस्तव.
१) मा. कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. प्र. कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
४) मा. संचालक, परीक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
५) मा. प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
६) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, परिपत्रक अभ्यासक्रम संकेतस्थळावर प्रसिद्ध करण्यात यावेत.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606 (MS)

(Credit Framework and Structure of

B. Sc. Data Science Second Year

with Multiple Entry and Exit Options as per NEP-2020)

UNDERGRADUATE PROGRAMME OF SCIENCE & TECHNOLOGY

Major in **DTS** and Minor in **DSM** (Subject)

Under the Faculty of Science & Technology

Swami Ramanand Teerth Marathwada University, Nanded
Faculty of Science and Technology (Three Optional in the First Year)
Framework for Four Year Multidisciplinary Degree Program with Multiple Entry and Exit
Subject: DTS (Major) /DSM (Minor 1)
B.Sc. Data Science Second Year
Eligibility: 12th Arts/Commerce/Science/MCVC

Year & Level	Semester	Optional 1 (Major) *(From the same Faculty)*	Optional 2 (Minor 1) *(From the same Faculty)*	Generic Elective (GE) *(select from Basket 3 of Faculties other than Science and Technology)*	Vocational & Skill Enhancement Course	Ability Enhancement Course (AEC) (Basket 4) Value Education Courses (VEC) / Indian Knowledge System (IKS) (Basket 5) *(Common across all faculties)*	Field Work / Project/Internship/ OJT/ Apprenticeship / Case Study Or Co-curricular Courses (CCC) (Basket 6 for CCC) *(Common across all faculties)*	Credits	Total Credits
1	2	3	4	6	7	8	9	10	11
2 (5.0)	III	SDTSCT1201 (2Cr) SDTSCP1203 (2Cr) SDTSCT1202 (2Cr) SDTSCP1204 (2Cr) 8 Credits	SDTSMT1201 (2Cr) SDTSMP1201 (2Cr) 4 Credits	SDTSGE1201 2 Credits	SDTSSC1201 2 Credits	ACEENG1201 (2cr) ACEMIL1201 (2Cr) (MAR/HIN/URD /KAN/PAL) 4 Credits	CCCXXX1201 (2Cr) (NCC/NSS/SPT(sports)/ CLS(Cultural Studies)/HWS(Health Wellness)/ YGE(Yoga Education) / 2Credits	22	44
	IV	SDTSCT1251 (2Cr) SDTSCP1253 (2Cr) SDTSCT1252 (2Cr) SDTSCP1254 (2Cr) 8 Credits	SDTSMT1251 (2Cr) SDTSMP1251 (2Cr) 4 Credits	SDTSGE1251 2 Credits	SDTSVC1251 2 Credits	ACEENG1251 (2cr) ACEMIL1251 (2Cr) (MAR/HIN/URD /KAN/PAL) VECEVS1251 (2Cr) 6 Credits		22	
	Cum. Cr.	16	08	04	04	10	02	44	

Abbreviations:

1. **DTS:** Data Science
2. **DSE:** Department/Discipline Specific Elective (Major)
3. **DSM:** Discipline Specific Minor
4. **GE/OE:** Generic/Open Elective
5. **VSEC:** Vocational Skill and Skill Enhancement Course
6. **VSC:** Vocational Skill Courses
7. **SEC:** Skill Enhancement Courses
8. **AEC:** Ability Enhancement courses
9. **MIL:** Modern Indian languages
10. **IKS:** Indian Knowledge System
11. **VEC:** Value Education Courses
12. **OJT:** On Job Training: (Internship/Apprenticeship)
13. **FP:** Field Projects
14. **CEP:** Community Engagement and Service
15. **CC:** Co-Curricular Courses
16. **RM:** Research Methodology
17. **RP:** Research Project/Dissertation

B. Sc. Data Science Second Year Semester III *(Level 5.0)*
Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SDSCCT1201	Statistical Methods for Data Science	02	--	**04**	03	--
	SDSCCP1202	Data Analytics with Python Part I	02	--		03.	--
	SDSCCT1203	Statistical Methods for Data Science (P)	--	02	**04**	--	04
	SDSCCP1204	Data Analytics with Python Part I (P)	-	02			04
Optional 2	SDSCMT1201	Analyzing Data with SQL	02	--	**04**	03	--
	SDSCMP1201	Analyzing Data with SQL (P)	-	02			04
Generic Electives *(from other Faculty)*	SDSCGE1201	Cyber Security **(Basket 3)**	02	--	**02**	02	--
Skill Based Course (related to Major)	SDSCSC1201	AI Tool- ChatGPT	--	02	**02**	--	04
Ability Enhancement Course	AECENG1201	**(Basket 4)**	02	--	**02**	02	--
Ability Enhancement Course	ACEMIL1201	**(Basket 5)**	02	--	**02**	02	--
Field Work/ Project/Internship	--	--	--	--	**--**	--	--
Community Engagement Services (CES)	CCCXXX1201	**(Basket 6 for CCC)**	--	02	**02**	--	02
Total Credits			**12**	**10**	**22**	**15**	**18**

B. Sc. Data Science Second Year Semester III *(Level 5.0)*

Examination Scheme

[20% Continuous Assessment (*CA)* and 80% End Semester Assessment (*ESA*)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)			
Optional 1	SDSCCT1201	Statistical Methods for Data Science	10	10	10	40	--	--	50
	SDSCCP1202	Data Analytics with Python Part I	10	10	10	40	--	--	50
	SDSCCT1203	Statistical Methods for Data Science (P)	--	--	--	--	20	30	50
	SDSCCP1204	Data Analytics with Python Part I (P)	--	--	--	--	20	30	50
Optional 2	SDSCMT1201	Analyzing Data with SQL	10	10	10	40	--	--	50
	SDSCMP1201	Analyzing Data with SQL (P)	--	--	--	--	20	30	50
Generic Elective	SDSCGE1201	Cyber Security **(Basket 3)**	10	10	10	40	--	--	50
Skill Based Course	SDSCSC1201	AI Tool- ChatGPT	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1201	**(Basket 4)**	10	10	10	40	--	--	50
Ability Enhancement Course	ACEMIL1201	**(Basket 4)**	10	10	10	40	--	--	50
Field Work/ Project/Internship			--	--	--	--	--	--	--
Community Engagement Services (CC)	CCCXXX1201	**(Basket 6 for CCC)**	--	--	--	--	20	30	50

B. Sc. Data Science Second Year Semester IV *(Level 5.0)*
Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SDSCCT1251	Data Analytics with Python Part II	02	--	04	03	--
	SDSCCP1252	Programming with R	02	--		03	--
	SDSCCT1253	Data Analytics with Python Part II (P)	--	02	04	--	04
	SDSCCP1254	Programming with R (P)	-	02		--	04
Optional 2	SDSCMT1251	Mathematics for Data Science	02	--	04	03	--
	SDSCMP1251	Mathematics for Data Science (P)	-	02		--	04
Generic Electives *(from other Faculty)*	SDSCGE1251	Web Designing **(Basket 3 of respective Faculty)**	02	--	**02**	02	--
Vocational Course (related to Major)	SDSCVC1251	Data Visualization using Tableau	--	02	**02**	--	04
Ability Enhancement Course	AECENG1251	**Basket 4**	02	--	**02**	02	--
Ability Enhancement Course	AECMIL1251	**Basket 4**	02	--	**02**	02	--
Value Education Courses (VEC)	VECEVS1251	**Basket 5**	02	--	**02**	02	--
Community Engagement Services (CES)	--	--	--	--	**--**	--	--
Total Credits			**14**	**08**	**22**	**17**	**16**

B. Sc. Data Science Second Year Semester IV *(Level 5.0)*

Examination Scheme

[20% Continuous Assessment (*CA*) and 80% End Semester Assessment (*ESA*)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9)
			Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)			(10)
Optional 1	SDSCCT1251	Data Analytics with Python Part II	10	10	10	40	--	--	50
	SDSCCP1252	Programming with R	--	--	--	--	20	30	50
	SDSCCT1253	Data Analytics with Python Part II (P)	10	10	10	40	--	--	50
	SDSCCP1254	Programming with R (P)	--	--	--	--	20	30	50
Optional 2	SDSCMT1251	Mathematics for Data Science	10	10	10	40	--	--	50
	SDSCMP1251	Mathematics for Data Science (P)	--	--	--	--	20	30	50
Generic Elective	SDSCGE1251	Web Designing **(Basket 3 of respective Faculty)**	10	10	10	40	--	--	50
Vocational Course	SDSCVC1251	Data Visualization using Tableau	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1251	**Basket 4**	10	10	10	40	--	--	50
Ability Enhancement Course	AECMIL1251	**Basket 4**	10	10	10	40	--	--	50
Value Education Courses (VEC)	VECEVS1251	**Basket 5**	10	10	10	40	--	--	50
Community Engagement Services (CC)	CCCXXX1251	Select from **(Basket 6)**	--	--	--	--	20	30	50

Course Structure: *Major1 -Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCCT1201	Statistical Methods for Data Science	03	--	02	--	02

Major1 -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)				
SDSCCT1201	Statistical Methods for Data Science	10	10	10	40	--	--	50

SDSCCT1201: *Statistical Methods for Data Science (*Major1*) Curriculum Details*

Course pre-requisite:

1. Basic concept of statistics.
2. Calculate and interact various measures of statistics.

Course Objectives:

- Interact ideas of random variable, frequency distribution, calculate and interact various measures in statistics

Course Outcomes:

Students will be able to:

- Explain the use of data collection & statistics.
- Recognize, examine & interact the basic principles of describing and presenting data.

Curriculum Details: *(There shall be FOUR Modules in each course)*

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		Introduction	
	1.1	Definition of Statistic	
	1.2	Importance & Limitation of Statistics	
	1.3	Scope of Statistics (Computer Science, Industry, Economics)	7
	1.4	Collection of data	
	1.5	Frequency Distribution	
	1.6	Discrete & continues variable	
2.0		**Measures of central Tendency**	
	2.1	Concept	
	2.2	Mean Definition, formulae, Numerical example	
	2.3	Median Definition, formulae, Numerical example	8
	2.4	Mode Definition, formulae, Numerical example	
	2.5	Quartile Definition, formulae, Numerical example	
	2.6	Merits and demerits of Mean median and mode	
3.0		**Correlation & Regression**	
	3.1	Concept	
	3.2	Types of correlation	
	3.3	Karl Pearson's coefficient of correlation	
	3.4	Numerical examples	7
	3.5	Regression	
	3.6	Regression equations/line	
	3.7	Numerical examples	
4.0		**Probability**	
	4.1	Definition	
	4.2	Sample space, Event, Types of events	
	4.3	Permutation & Combination	
	4.4	Theorems of probability a. $P(A)=1-P(A')$ b. $0 \leq P(A) \leq 1$ c. $P(A \cup B)=P(A)+P(B)-P(A \cap B)$	8
	4.5	Examples	
		Total	**30**

Reference Books:

1. "STATISTICAL METHODS" III Edition (2001) S P Gupta & Kapoor
2. "Business Statistics" II Edition (2005) Gupta and Kapoor
3. Foundation of Mathematics statistics – S. C. Gupta & V. K. Kapoor
4. Statistical methods – S. C. Gupta.

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCCP1203	Statistical Methods for DS (practical)	--	02	--	02	02

Major 1 -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)				
SDSCCP1203	Statistical Methods for DS (practical)	--	--	--	--	30	20	50

SDSCCP1203: Statistical Methods for Data Science *(practical) (Major 1)*

Sr. No.	Name of the Practical
1	Calculate **Mean** for a given dataset.
2	Calculate **Median** for a given dataset.
3	Calculate **Mode** for a given dataset.
4	Calculate **Quartile** a given dataset.
5	Calculate the **Pearson correlation coefficient.**
6	Interpret the relationship between two variables.
7	Calculate the Regression line X On Y.
8	Calculate the Regression line Y On X.
9	Construction of frequency distribution.
10	To find correlation positive or negative.
11	Permutation Problems.
12	Combination problems.
13	Sample space problems.
14	Problems on Addition theorem.
15	Problems on probability.

Course Structure: *Major 2 – Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCCT1202	**Data Analytics with Python – Part I**	03	--	02	--	02

Major 2 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCCT1202	**Data Analytics with Python – Part I**	10	10	10	40	--	--	**50**

SDSCCT1202: **Data Analytics with Python – Part I** (Major 2) Curriculum Details

Course pre-requisite:

1. Basic Python Programming Knowledge
2. Fundamentals of Statistics or Mathematics.
3. Familiarity with Excel or Data Handling Concepts

Course Objectives:

1. Introduce foundational concepts of data analytics using Python.
2. Develop proficiency in using Python libraries such as Pandas, NumPy, and Matplotlib.
3. Apply data analytics techniques to solve real-world problems.

Course Outcomes:

Students will be able to:

1. Perform data cleaning, manipulation, and analysis using Python.
2. Visualize data using libraries like Matplotlib and Seaborn to derive meaningful insights.
3. Interpret analytical results to support data-driven decision making.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Introduction to Data Analytics and Python for Data Handling**	
	1.1	Introduction to Data Analytics – Definition, Need, and Applications	
	1.2	Python basics for Data Analytics: Variables, Data Types, Functions, Loops	
	1.3	Functions and Lambda Expressions	
	1.4	Introduction to Jupyter Notebook, Spyder, and VS Code	
	1.5	Data Structures in Python: Lists, Tuples, Dictionaries	8
	1.6	File Handling in Python	
	1.7	Exception Handling – try, except, finally, raise	
	1.8	Modules and Packages	
	1.9	Introduction to Object Oriented Programming in Python	
	1.10	Iterators, Generators, and Decorators	
2.0		**NumPy for Numerical Computing, and SciPy for Scientific Computing**	
	2.1	Introduction to NumPy – array() creation	
	2.2	Indexing, slicing, and iterating arrays	
	2.3	Array shape manipulation and broadcasting	
	2.4	Mathematical operations on arrays	
	2.5	Aggregation functions – mean(), sum(), min(), max()	7
	26	Random number generation – random(), randint()	
	2.7	Linear algebra operations – dot(), inv(), eig()	
	2.8	Working with large datasets in memory	
	2.9	Introduction to SciPy and its submodules	
3.0		**Data Manipulation using Pandas**	
	3.1	Introduction to Pandas	

	3.2	Series and DataFrame
	3.3	Reading and Writing Data
	3.4	Indexing and Selecting Data
	3.5	Data Inspection and Summary
	3.6	Filtering and Conditional Selection
	3.7	Handling Missing Data
	3.8	Data Transformation
	3.9	Grouping and Aggregation
	3.10	Merging, Joining, and Concatenation
4.0		**Data Analysis and Visualization using Pandas and Matplotlib**
	4.1	Sorting and Ranking in Pandas
	4.2	Renaming Columns and Indexes
	4.3	Creating Pivot Tables in Pandas
	4.4	Handling Duplicate Data
	4.5	Introduction to Data Visualization
	4.6	Overview of Matplotlib Library
	4.7	Plotting Line and Bar Charts using Pandas
	4.8	Customizing Basic Plots (title, labels, legend)

Reference Books:

- Python for Data Analysis – *Wes McKinney* (O'Reilly)
- Python Data Science Handbook – *Jake VanderPlas* (O'Reilly)
- Think Stats – *Allen B. Downey* (O'Reilly)
- Hands-On Data Analysis with Pandas – *Stefanie Molin* (Packt)
- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow – *Aurélien Géron* (O'Reilly)
- Python Machine Learning – *Sebastian Raschka* (Packt)

Course Structure: *Major 2 – Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCCP1204	Data Analytics with Python – Part I	--	04	--	02	02

Major 2 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCCP1204	Data Analytics with Python – Part I	--	--	--	--	20	30	**50**

SDSCCP1204: **Data Analytics with Python – Part I** (Major 2) Practical List

Practical No.	Title of Practical
1	Write a Python program using variables, data types, loops, and functions for basic data handling.
2	Create user-defined functions and lambda expressions for performing operations on lists and dictionaries.
3	Demonstrate basic file handling: read/write a text file and count word frequency.
4	Implement exception handling using try, except, else, finally, and raise.
5	Create and use modules and packages to structure a Python program.
6	Write a Python class for managing student data using Object-Oriented Programming concepts.
7	Develop a program using iterators, generators, and decorators for customized data processing.
8	Create NumPy arrays and perform basic operations: slicing, indexing, reshaping, and broadcasting.
9	Perform mathematical and statistical operations (mean, sum, min, max) on NumPy arrays.
10	Use NumPy for matrix multiplication, finding inverse and eigenvalues of a matrix.

11	Create a Pandas DataFrame from a CSV file and perform indexing, filtering, and selection.
12	Handle missing data in Pandas using fillna(), dropna(), and detect duplicates.
13	Perform grouping and aggregation operations using groupby(), and merge/join DataFrames.
14	Create pivot tables, rank data, rename columns, and combine DataFrames using append() and concat().
15	Use Pandas and Matplotlib to plot line and bar charts with custom labels, titles, and legends.

Course Structure: *Minor 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCMT1201	Analyzing Data with SQL	03	--	02	--	02

Minor 1 -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)				
SDSCMT1201	Analyzing Data with SQL	10	10	10	40	--	--	50

SDSCMT1201: Analyzing Data with SQL (Minor 1) Curriculum Details

Course pre-requisite:

    1.   Basic knowledge of computers and Familiarity with Databases.

Course Objectives:

- Understand and Apply Core SQL Syntax
- Perform Data Aggregation and Grouping
- Join and Relate Data Across Multiple Tables

Course Outcomes:

Students will be able to:

- Write basic SQL queries to retrieve, filter, and sort data from relational databases.
- Use aggregate functions and grouping to summarize large datasets effectively.
- Combine data from multiple tables using various types of joins for comprehensive analysis.
- Apply conditional logic and date functions to solve real-world data problems.
- Construct subqueries and views to simplify and modularize complex data analysis.
- Perform basic data analysis using SQL to support data-driven decision-making.

Curriculum Details: *(There shall be FOUR Modules in each course)*

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Introduction to SQL and Databases**	
	1.1	What is a Database? Understanding Tables, Rows, and Columns	**5**
	1.2	Introduction to SQL and Relational Databases	
	1.3	Basic SQL Syntax: SELECT, FROM, WHERE	
	1.4	Filtering with logical operators (AND, OR, NOT)	
	1.5	Sorting with ORDER BY, limiting results with LIMIT	
2.0		**Aggregation and Grouping**	
	2.1	Using Aggregate Functions: SUM(), AVG(), COUNT(), MAX(), MIN()	
	2.2	Grouping Data with GROUP BY	
	2.3	Filtering Groups with HAVING	
	2.4	Working with DISTINCT and NULL values	**10**
3.0		**Working with Multiple Tables**	
	3.1	Understanding Primary and Foreign Keys	**10**
	3.2	Joins: INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN	
	3.3	Joining Three or More Tables	
	3.4	Introduction to Subqueries	
4.0		**Advanced SQL for Analysis**	
	4.1	**CASE Statements for conditional logic**	**5**
	4.2	Working with Dates and Time Functions	
	4.3	Creating Views , Function	
	4.4	Stored Procedure	
		Total	**40**

Reference Books:

1. *Learning SQL* by Alan Beaulieu
2. *Practical SQL* by Anthony DeBarros
3. *SQL for Data Analysis* by Cathy Tanimura

Course Structure: *Minor 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCMP1201	Analyzing Data with SQL (practical)	--	02	--	02	02

Minor 1 -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)				
SDSCMP1201	Analyzing Data with SQL (practical)	--	--	--	--	20	30	50

SDSCMP1201: Analyzing Data with SQL *(practical) (Minor 1)*

Exp No	Topics
1	**Retrieving Data Using the SQL SELECT Statement**
2	**Restricting and Sorting Data using operators**
3	**Using Conversion Functions and Conditional Expressions**
4	**Using Single-Row Functions to Customize Output**
5	**Alter date formats for display using functions**
6	**Convert column data types using functions**
7	**Use NVL functions**
8	**Use IF-THEN-ELSE logic and other conditional expressions in a SELECT statement**
9	**Writing queries that use the group functions**
10	**Grouping by rows to achieve more than one result**
11	**Restricting groups by using the HAVING clause**
12	**Displaying Data from Multiple Tables Using Inner Join & outer Join**
13	**Displaying Data from Tables Using Self Join & Cross Join**
14	**Retrieving Data by Using Subqueries**
15	***Creating Views & stored procedure***

Course Structure: *Generic Elective – Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCGE1201	Cyber Security	03	--	02	--	02

Generic Elective – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCGE1201	Cyber Security	10	10	10	40	--	--	50

SDSCGE1201: Cyber Security Curriculum Details (*Generic Elective*)

Course pre-requisite:

1. Basic Computer Skills
2. Familiarity with Networking Concepts
3. Interest in Technology & Problem Solving

Course Objectives:

1. Understand key terms and concepts in Cryptography, Governance and Compliance.
2. Develop cyber security strategies and policies.
3. Practice with an expertise in academics to design and implement security solutions.

Course Outcomes:

Students will be able to:

1. Measure the performance and troubleshoot cyber security systems.
2. Analyze and evaluate the cyber security needs of an organization.
3. Implement cyber security solutions and use of cyber security, information and cyber/computer forensics software/tools.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**IT Act and Encryption**	
	1.1	Object and Scope of the Act	**5**
	1.2	Symmetric Cryptography	
	1.3	Asymmetric Cryptography	
	1.4	RSA Algorithm	
	1.5	Public Key Encryption	
2.0		**Authentication of Electronic records & E-Governance**	
	2.1	Authentication of Electronic records	**10**
	2.2	Digital Signature	
	2.3	RSA Digital Signature	
	2.4	Hash Function	
	2.5	Working of Digital Signature	
3.0		**Certifying Authorities**	
	3.1	Need of Certifying Authorities	**5**
	3.2	Functioning of Certifying Authorities	
	3.3	Types of Certificates ,	
	3.4	Identification, Authorizing, Transactional certificate	
	3.5	Appointment and Functions of Controller	
4.0		**Domain Name Disputes and Cyber Crimes**	

	4.1	Background of Domain	
	4.2	Insertion of Internet Domain Names and the trademark Law	
	4.3	Classification of Cyber Crime	
	4.4	Damage to computer System: Unauthorized Access, Packet Sniffing, Tempest attack, Password Cracking, Butter overflow	**10**
	4.5	Computer virus: Viruses, Logic Bomb, Worms	

Reference Books:

1. Cyber Law in India by Farooq Ahmad – Pioneer Books

2. Hand book of Cyber & E-commerce Laws by P.M. Bakshi & R.K.Suri – Bharat Law house New Delhi

3. The Indian Cyber Law by Suresh T Vishwanathan – Bharat Law house New Delhi.

Course Structure: *Skill Based Course – Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCSC1201	AI Tool- Chat GPT	--	04	--	02	02

Skill Based Course – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCSC1201	AI Tool- Chat GPT	--	--	--	--	20	30	**50**

SDSCSC1201: AI Tool-Chat GPT (*Skill Based Course*) Practical List

Practical No.	Title of Practical
1	Generate a short creative story using ChatGPT based on a given theme
2	Summarize a long article or paragraph into exactly 100 words using ChatGPT
3	Translate an english paragraph into hindi or marathi using ChatGPT
4	Plan a weekly healthy meal chart for students using ChatGPT
5	Design a professional resume and cover letter using ChatGPT prompts
6	Create 5 objective quiz questions on any academic topic using ChatGPT
7	Debug a simple program of any programming languange by asking ChatGPT for code corrections
8	Write a formal leave application email using ChatGPT
9	Prepare a basic lesson plan for a school-level subject using ChatGPT
10	Generate creative social media captions for an image or occasion
11	Plan a 3-day budget-friendly trip to goa using ChatGPT's suggestions
12	Use ChatGPT to simulate a role-play conversation between doctor and patient
13	Solve simple logical reasoning or puzzle-based questions using ChatGPT
14	Generate a basic marketing plan for a new product launch using ChatGPT
15	Write an honest product review based on features and experience using ChatGPT

Course Structure: *Major 1 – Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCCT1251	Data Analytics with Python – Part II	03	--	02	--	02

Major 1 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCCT1251	Data Analytics with Python – Part II	10	10	10	40	--	--	50

SDSCCT1251: **Data Analytics with Python – Part II** (Major 1) Curriculum Details

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Course pre-requisite:
1. Completion of Data Analytics with Python – Part I
2. Understanding of Basic Statistics and Probability
3. Basic Knowledge of Python Libraries

Course Objectives:
1. Advance students' knowledge of data analytics by introducing machine learning techniques and predictive modeling.
2. Enhance practical skills in using Python libraries such as Scikit-learn, StatsModels, and advanced Pandas for complex data analysis.
3. Enable students to apply analytical models to real-world datasets and interpret the results for informed decision-making.

Course Outcomes:
Students will be able to:

1. Implement advanced data analysis techniques such as regression, classification, and clustering using Python.
2. Work with real-world datasets to build predictive models and evaluate their performance.
3. Utilize libraries like Scikit-learn and StatsModels for machine learning and statistical analysis.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Recap and Advanced Python Concepts for Data Analytics**	
	1.1	Quick recap: data structures, NumPy, Pandas, and Matplotlib in brief	
	1.2	Working with JSON and API data in Python	
	1.3	Working with time-series data using Pandas	
	1.4	Datetime indexing and resampling	**8**
	1.5	Introduction to regular expressions in Python	
	1.6	Advanced string operations in Pandas	
	1.7	Working with multi-index in DataFrame	
	1.8	Using Python with SQL (SQLite or MySQL)	
2.0		Advanced Data Visualization Techniques	
	2.1	Introduction to Seaborn for statistical visualizations	
	2.2	Creating and customizing pairplots, heatmaps, and boxplots	
	2.3	Distribution plots and categorical plots	
	2.4	Custom color palettes and styles in Seaborn	**7**
	2.5	Introduction to Plotly for interactive plots	
	26	Time-series visualization with Matplotlib and Plotly	
	2.7	Creating dashboards using Plotly Dash (basics)	
	2.8	Saving and exporting plots in various formats	
3.0		**Exploratory Data Analysis (EDA) and Feature Engineering**	
	3.1	Understanding EDA workflow and goals	
	3.2	Identifying outliers using statistical methods and visualizations	**8**
	3.3	Handling skewed data: transformation techniques	

	3.4	Correlation analysis and feature relationships	
	3.5	Feature scaling – MinMax, StandardScaler	
	3.6	Feature encoding – Label, OneHot	
	3.7	Dimensionality reduction using PCA (basic concept & code)	
	3.8	Real-life EDA on public datasets (Kaggle / Titanic / etc.)	
4.0		**Introduction to Predictive Analytics and ML in Python**	
	4.1	Overview of Machine Learning and its types	
	4.2	Introduction to scikit-learn: data splitting and model building	
	4.3	Simple and Multiple Linear Regression	
	4.4	Logistic Regression for binary classification	
	4.5	Model evaluation metrics – accuracy, MAE, RMSE, confusion matrix	7
	4.6	Cross-validation and overfitting concepts	
	4.7	Decision Tree (basic implementation)	
	4.8	mini project: End-to-end model building and evaluation	

Reference Books:

1. **Python Data Science Handbook** by Jake VanderPlas – O'Reilly
2. **Hands-On Data Analysis with Pandas** by Stefanie Molin – Packt
3. **Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow** by Aurélien Géron – O'Reilly
4. **Python for Data Analysis** by Wes McKinney – O'Reilly
5. **Think Stats** by Allen B. Downey – O'Reilly

Course Structure: *Major 1 – Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCCP1253	Data Analytics with Python – Part II	--	04	--	02	02

Major 1 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCCP1253	Data Analytics with Python – Part II	--	--	--	--	20	30	50

SDSCCP1253: **Data Analytics with Python – Part II** (Major 1) Practical List

Practical No.	Title of Practical
1	Parse and analyze JSON data and display it in DataFrame
2	Work with datetime objects and perform resampling/rolling operations
3	Apply regex filtering and advanced string functions in Pandas
4	Execute SQL queries from Python and analyze the result
5	Create Seaborn plots: heatmap, pairplot, and violinplot
6	Build interactive visualizations using Plotly
7	Create a simple dashboard using Plotly Dash
8	Perform full EDA (visual + statistical) on a dataset
9	Detect and treat outliers using visualization and Z-score
10	Encode categorical variables and scale features
11	Apply PCA for dimensionality reduction
12	Build and evaluate a simple linear regression model

13	Build and evaluate a logistic regression model
14	Use confusion matrix and cross-validation for model assessment
15	Mini project: Complete pipeline from EDA to model prediction

Course Structure: *Major 2 – Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCCT1252	Programming with R	03	--	02	--	02

Major 2 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCCT1252	Programming with R	10	10	10	40	--	--	50

SDSCCT1252: Programming with R (Major 2) Curriculum Details

Course pre-requisite:

1. Basic knowledge of any programming language (e.g., C or Python)
2. Understanding of fundamental data types and control structures
3. Basic statistical concepts such as mean, median, and variance
4. Familiarity with spreadsheet tools like MS Excel or Google Sheets

Course Objectives:

1. To introduce the syntax, features, and environment of R programming
2. To understand how to work with R data types and structures
3. To provide hands-on experience in data analysis and visualization
4. To apply statistical methods and generate insights using R

Course Outcomes:

After completing this course, students will be able to:

1. Demonstrate understanding of R environment and basic syntax
2. Apply control structures and functions to build R scripts
3. Manipulate and analyze data using R data structures
4. Create meaningful data visualizations using R libraries
5. Apply basic statistical operations and real-world problem solving using R

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Unit 1: Basics of R Programming**	
	1.1	Introduction to R: Features, Uses & Applications	**8**
	1.2	Installation of R and RStudio, RStudio Interface and Basic Commands	
	1.3	Data Types in R, Variables and Constants	
	1.4	Type Conversion and Coercion	
	1.5	Operators in R: Arithmetic, Relational, Logical	
	1.6	Input/Output operations using readline(), print(), cat()	
	1.7	Comments and Script Files (.R files)	
	1.8	Writing and executing basic R programs	
2.0		**Control Structures, Functions and Data Structure in R**	
	2.1	Decision Making: if, if-else, nested if, switch() statement	**10**
	2.2	Loops in R: for, while, repeat, Loop control: break, next	
	2.3	Introduction to Functions, Writing user-defined functions, Function arguments and return values	
	2.4	Scope of variables: local vs global	
	2.5	Recursive functions	
	2.6	R built-in functions and function documentation (?, help())	
	2.7	Vectors and Vector Operations	
	2.8	Lists and Nested Lists	
	2.9	Matrices and Matrix Operations	
	2.10	Arrays in R	
3.0		**Data Structures and Data Handling**	
	3.1	Data Frames: Creation and Manipulation	

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	3.2	Factors and Factor Levels	
	3.3	Indexing and Subsetting Data	
	3.4	Importing Data: read.csv(), read.table()	**6**
	3.5	Exporting Data: write.csv(), write.table()	
	3.6	Missing values and NA handling	
4.0		**Data Manipulation, Visualization & Basic Statistics**	
	4.1	Introduction to Tidyverse: dplyr, tidyr	
	4.2	Data Transformation: select(), filter(), mutate(), arrange()	
	4.3	Summarizing Data: group_by() and summarize()	
	4.4	Introduction to Data Visualization	**6**
	4.5	Base R plotting functions: plot(), hist(), barplot()	
	4.6	Introduction to ggplot2: aesthetics, geoms, layers	
	4.7	Bar Charts, Line Charts, Histograms, Boxplots	

Reference Books:

1. **"The Art of R Programming" by Norman Matloff, 1st Edition, No Starch Press, 2011 –**
2. **"Hands-On Programming with R" by Garrett Grolemund, 1st Edition, O'Reilly Media, 2014**
3. **"R for Data Science" by Hadley Wickham & Garrett Grolemund, 1st Edition, O'Reilly Media, 2017**
4. **"R in Action" by Robert Kabacoff, 2nd Edition, Manning Publications, 2015**

Course Structure: *Major 2– Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCCP1254	Programming with R	--	04	--	02	02

Major 2 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCCP1254	Programming with R	--	--	--	--	20	30	**50**

SDSCCP1254: Programming with R (Major 2) Practical List

Practical List
1. Basic R Commands and Data Types
Practice basic arithmetic, variables, constants, and type coercion in R.
2. Using readline(), print(), and cat() Functions
Write a program to accept user input and display it using print() and cat().
3. Creating and Executing R Script Files
Create .R files with comments and execute them in RStudio.
4. Conditional Statements in R
Write programs using if, if-else, nested if, and switch() statements.
5. Looping in R
Demonstrate use of for, while, and repeat loops with break and next.
6. User-defined Functions
Create and use functions with arguments and return values.
7. Variable Scope and Recursive Functions
Write examples to demonstrate local vs global variables and recursive functions.

8. Vector and Vector Operations
Create vectors, perform operations, and apply indexing.
9. Working with Lists and Matrices
Create and manipulate lists and matrices with relevant operations.
10. Array Creation and Manipulation
Define arrays and perform slicing and arithmetic operations.
11. Handling Data Frames and Factors
Create data frames, modify them, and manage factors and levels.
12. Importing and Exporting Data
Use read.csv(), read.table(), write.csv() functions with file data.
13. Data Cleaning and Missing Value Handling
Work with NA values and perform data cleaning.
14. Data Manipulation using dplyr
Use select(), filter(), mutate(), arrange() for transforming data.
15. Data Visualization using ggplot2 and base R
Create bar charts, line charts, histograms, and boxplots using both base and ggplot2.

Course Structure: *Minor 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCMT1251	Mathematics for Data Science	03	--	02	--	02

Minor 1 -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)				
SDSCMT1251	Mathematics for Data Science	10	10	10	40	--	--	50

SDSCMT1251: *Mathematics for Data Science (Minor 1) Curriculum Details*

Course pre-requisite:

2. Basic knowledge of Mathematics.

Course Objectives:

- Understand the Mathematical Foundations.
- Develop Problem-Solving and Analytical skill.
- Enable Practical Application of Mathematical Concepts in Real-World AI Problems

Course Outcomes:

- o Solve Complex AI/ML Problems with a Mathematical Approach
- o Understand and apply the concepts of **Mathematics** for modeling data
- o Develop Research and Innovation in AI/ML

Curriculum Details:*(There shall be FOUR Modules in each course)*

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Set theory**	
	1.1	Set definition, types	
	1.2	Operation on set	
	1.3	Venn diagram	
	1.4	Problems on set operation	**7**
2.0		**Mathematical Logic**	
	2.1	Proposition	
	2.2	Compound statement	
	2.3	Logical Connectivity	
	2.4	Tautology, Contradiction, contingency	
	2.5	Logical Equivalence	
	2.7	Problems on Logical Equivalence	
	2.8	Problems on Tautology, Contradiction, contingency.	**8**
3.0		**Function and Relation**	
	3.1	Function	
	3.2	Types of function	
	3.3	Relation	
	3.4	Types of relation	
	3.5	Cartesian product	
	3.6	Examples on function and relation	
4.0		Graph Theory	
	4.1	Basic Concepts of Graph Theory	
	4.2	Types of Graphs	
	4.3	Degree of vertex	
	4.4	Connected and Disconnected graph	
	4.5	Walk, path, circuit	**7**
		Total	**30**

Reference Books:

1. Elements of discrete mathematics, C. L. Liu
2. Discrete mathematics, Olympia Nicodemi
3. Graph theory, Narsing Deo
4. 4. Basic mathematics, Mittal & Agrawal

Course Structure: *Minor 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCMP1251	Mathematics for Data Science (practical)	--	02	--	02	02

Minor 1-Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)				
SDSCMP1251	Mathematics for Data Science (practical)	--	--	--	--	20	30	50

SDSCMP1251: *Mathematics for Data Science (practical) (Minor 1)*

Sr. No.	Name of the Practical
1	To perform union and intersection operations on two sets and understand how these operations work
2	To perform Difference operations on two sets and understand how these operations work
3	To perform Complement operations on two sets and understand how these operations work
4	To calculate the Cartesian product of two sets and understand the concept of ordered pairs.
5	To understand how to construct truth tables for logical expressions and determine their truth values
6	To understand and apply logical equivalences to simplify logical expressions.
7	To understand how to construct truth tables for Tautology
8	To understand how to construct truth tables for Contradiction
9	To understand the difference between a relation and a function and determine whether a given relation is a function.
10	To find the domain and range of a given function defined by a set of ordered pairs or a rule.

11	To classify functions based on their properties: one-one (injective), onto (surjective), and bijective.
12	To construct a **Knowledge Graph** from a given dataset
13	To analyze a **social network graph** using centrality measures:
14	To analyze a **Walks** measures in graph:
15	To Analyze degree of vertex.

Course Structure: *Generic Elective – Teaching Scheme*

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCGE1251	Web Designing	03	--	02	--	02

Generic Elective – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)				
SDSCGE1251	Web Designing	10	10	10	40	--	--	**50**

SDSCGE1251: Web Designing (*Generic Elective*) Curriculum Details

Course pre-requisite:

1. Should have basic knowledge about computer.

2. Should have basic knowledge of internet.

Course Objectives:

1. To improve the skill to create the static web page.

2. To develop the ability to create the dynamic web pages.

3. To enhance the ability of Insert a graphic within a web page.

4. To improve the skills to Create, validate and publish a web page

Course Outcomes:

Students will be able to:

1. Able to design and implement dynamic websites

2. Able to implement new html 5 tags.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Introduction of Web**	
	1.1	History of WWW.	
	1.2	Web browser and web Server.	
	1.3	Web Protocols HTTP & FTP	7
	1.4	What is Tags & attributes of HTML	
	1.5	Structure of HTML	
	1.6	Create web page using Headings, Paragraph, BR & HR	
2.0		**Implementing of HTML**	
	2.1	Text level elements	
	2.2	Creating Ordered & Unordered List	
	2.3	Marquee Tag	7
	2.4	Using Images in HTML	
	2.5	Client-Server Model	
	5.6	Creating hyperlink with Anchor Tag	
3.0		**HTML Advance and HTML5**	
	3.1	Using frames in HTML	
	3.2	Creating Table in HTML	
	3.3	Creating Forms in HTML	8
	3.4	Introduction to HTML 5	
	3.5	Structure of HTML 5	
4.0		**Designing to HTML with CSS**	
	4.1	Introduction to CSS with Advantage and Disadvantages	
	4.2	Internal CSS: Inline and Embedded	
	4.3	External CSS	8
	4.4	Framework of CSS: Bootstrap	
	4.5	Introduction to Tailwind CSS	
	4.6	CSS Selectors	
		Total	**30**

Reference Books:

1. "HTML & CSS: The Complete Reference", 5th Edition By Thomas A. Powel, Publisher(s): Tata McGraw Hill publication. ISBN-13978-0070701946
2. "HTML & XHTML: The complete Reference", 4th Edition By Thomas A. Powel, Publisher(s):Tata McGraw Hill publication, ISBN-13978-0072229424

Course Structure: *Vocational Course -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SDSCVC1251	Data Visualization using Tableau	--	02	--	02	02

Vocational Course -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)				
SDSCVC1251	Data Visualization using Tableau	--	--	--	--	20	30	50

SDSCVC1251: *Data Visualization using Tableau (Skill Based Course) Curriculum Details*

Course pre-requisite:

3. Basic knowledge of computers and Familiarity with Databases.
4. Basic Excel or Spreadsheet Knowledge

Course Objectives:

- Understand the fundamentals of data visualization
- Navigate the Tableau interface effectively
- Connect to various data sources

Course Outcomes:

- Design and develop interactive data visualizations using Tableau's tools.
- Clean, transform, and analyze datasets
- Apply visualization best practices and storytelling techniques

Students will be able to:

- Create and interpret basic visualizations such as bar charts, line graphs, and maps using Tableau.
- Design interactive dashboards by combining multiple visual elements and applying filters and actions.
- Apply data cleaning and transformation techniques within Tableau to prepare datasets for meaningful analysis.

Curriculum Details: *(There shall be FOUR Modules in each course)*

Exp No	Topics
1	**Connect to a Data Source**
2	**Create a Bar Chart Visualization**
3	**Create a Line Chart Visualization**
4	**Apply Filters Visualization**
5	**Explore different chart types: Pie, TreeMap, Scatter, etc.**
6	**Create a Pie Chart Visualization**
7	**Sort and Group Data**
8	**Combine multiple charts (bar + map + line) into one dashboard.**
9	**Use dropdowns and sliders to interactively filter dashboard data.**
10	**Build a Map Visualization**
11	**Create a Calculated Field**
12	**Build a Hierarchy for Drill Down**
13	**Use Parameters in a View**
14	**Create a Dual-Axis Chart**
15	**Publish or Export Dashboard**

Reference Books:

- **Tableau for Dummies** Molly Monsey & Paul Sochan

- **Learning Tableau (4th Ed.)** Joshua N. Milligan

Guidelines for the Course Assessment:

A. Continuous Assessment (CA) (20% of the Maximum Marks) of theory and practical courses:

    i.   **For Theory Course:** CA shall form 20% of the Maximum Marks and shall be carried out over the entire semester. It shall be done by conducting **Two Tests** (Test I on 40% curriculum) and **Test II** (on remaining 40% syllabus) and average of the marks scored by a student in these two tests of a particular paper shall be taken as the **CA** score.

    ii.   **For Practical Course:** CA score of the practical course shall be marks scored by a student in the internal practical examination conducted by the concerned teacher.

B. End Semester Assessment (80% of the Maximum Marks) of theory and practical courses:

(For illustration a paper of 02 credits, 50 marks has been considered and shall be modified appropriately depending upon credits of the individual paper)

Question Paper Pattern of the ESA:
    i. **ESA Question paper shall consist 6 questions, each of 10 marks**
    ii. **Question No.1 shall be compulsory and shall be based on the entire syllabus**
    iii. Students shall have to solve *ANY THREE* of the remaining Five Questions (i.e. from question 2 to 6)
    iv. **Students shall have to solve a TOTAL of 4 Questions.**

C. Assessment of On Job Training (OJT) Course (for 04 credits):

    a. Continuous assessment part (**40%, 40 marks out of 100**) of this course shall be done by the mentor of the student, where he /she is supposed to complete his On Job Training. This shall be based on the regularity, participation and performance of the students at the place of OJT.

    b. Semester End Assessment (ESA) (**60% of the total marks, 60 marks out of 100**) of this course shall be done by a panel of examiners in two parts

    i. based on the work report submitted by the student (**50% i.e. 30 marks)** and

    ii. **Remaining 50%** (30 marks) shall be based on his presentation and viva-voce on the work carried to be assessed by the panel of examiners. This assessment shall be done along with practical examinations of respective courses / subjects.

D. Assessment of Field Project (FP) and Research Project (RP) (e.g. for 02 credits)

    a. Continuous assessment part (**40%, 20 marks out of 50**) of this course shall be done by the mentor of the student and shall be based on regularity, experimental work and performance of the student.

    b. Semester End Assessment (ESA) (**60% of the total marks, 30 marks out of 50**) of this course shall be done shall be done by a panel of examiners in two parts

        i. based on the work report submitted by the student (**50% i.e. 30 marks)** and

        ii. **Remaining 50%** (30 marks) shall be based on his presentation and viva-voce on the work carried out by the student. This assessment shall be done along with practical examinations of the respective courses / subjects.

E. Assessment of Co-Curricular courses (CCC):

    a. Assessment of the CCC course shall be done by the respective course coordinator as a part of CA and be based on the regularity, performance of a student and his participation in various activities as prescribed in the regulations prepared in this regard.

    b. The End Semester Assessment (ESA) of the CCC courses shall be done as per the regulations prepared in this regard and shall be done on the basis of the write-up, presentation by the student on the activities that he has carried out in a semester.

    c. Students shall have freedom to opt for more than one CCC courses. However, score of the best performing CC shall be considered for preparing his result.

F. Syllabi, Teaching and Examination Scheme for the courses in Column 7 and Column 8 (AEC, VEC, IKS, CI, EVS, CCCs, etc.) shall be common for all the students from different faculties.

Note: **Number of lectures required to cover syllabus of a course depends on the number of credits assigned to a particular course. One credit of theory corresponds to 15 Hours lecturing and for practical course one credit corresponds to 30 Hours. For example, for a course of two credits 30 lectures of one hour duration are assigned, while that for a three credit course45 lectures.**

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