॥ 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

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

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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शैक्षणिक वर्ष २०२४–२५ पासून राष्ट्रीय शैक्षणिक धोरणा नुसार लागू केलेल्या विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी प्रथम वर्षाचा सुधारीत (दुरुस्ती) (Syllabus) अभ्यासक्रमाबाबत. .

प रि प त्र क

संदर्भ:–जा.क्र.शै–१ / एनइपी / युजीप्रथमवर्षअभ्यासक्रम / २०२४–२५ / ३१७दिनांक २८.११.२०२४

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत अभ्यासमंडळाने दिनांक ०५ ऑक्टोबर २०२४ रोजीच्या बैठकीत B. Sc. Artifical Intelligence and Machine Learning या कोर्सेसचा अभ्यासक्रम शैक्षणिक वर्ष २०२४–२५ पासून लागू करण्याबाबत शिफारस केल्यानुसार तसेच मा. अधिष्ठाता मंडळाच्या दिनांक ०८ नोव्हेंबर २०२४ रोजीच्या बैठकीतील ऐनवेळचा विषय क्रमांक ३/६७–२०२४ च्या ठरावातील केलेल्या शिफारसी नुसार अभ्यासक्रम लागू करण्याच्या दृष्टीने मा. कुलगुरू महोदयांनी विद्यापरिषदेच्या मान्यतेच्या अधीन राहून मान्यता प्रदान केल्यानुसार राष्ट्रीय शैक्षणिक धोरणानुसार शैक्षणिक वर्ष २०२४–२५ पासून अभ्यासक्रम लागू करण्यात आला आहे. तथापी वरील संदर्भीय परिपत्रका अन्वये प्रकाशित केलेल्या अभ्यासक्रमामध्ये अभ्यासमंडळाने किरकोळ दुरुसती करुन अभ्यासक्रम सादर केला असून मा. अधिष्ठाता,विज्ञान व तंत्रज्ञान विद्याशाखा यांच्या मान्यतेने दुरुस्ती केलेला खालील अभ्यासक्रम लागू करण्यात येत आहे.

1. B. Sc. I year Artificial Intelligence & Machine Learning Single Major (AI& ML)

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.

सहा. कुलसचिव

शैक्षणिक (१–अभ्यासमंडळ) विभाग

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शै–१ / एनइपी / युजीप्रथमवर्षअभ्यासक्रम / २०२५–२६ /
दिनांक २९.०७.२०२५

प्रत : १) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
३) मा. प्राचार्य, सर्व संबधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) मा. संचालक, सर्व संकुले परिसर व उपपरिसर, प्रस्तुत विद्यापीठ
५) मा. प्राचार्य, न्यू मॉडल डिग्री कॉलेज हिंगोली.
६) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, सदर परिपत्रक संकेतस्थळावर प्रसिध्द करण्यात यावे.

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

(Credit Framework and Structure of

B.Sc. Artificial Intelligence and Machine Learning

(AI & ML)

Eligibility:12th Arts/Commerce/ Science/MCVC

(Single Major)

First Year

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

UNDERGRADUATE PROGRAMME OF

SCIENCE & TECHNOLOGY

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science and Technology (Three Optional in the First Year)

Credit Framework for Four Year Multidisciplinary Degree Program with Multiple Entry and Exit

Subject: AML (Major) /DSM (Minor 1 and Minor 2)

B.Sc. Artificial Intelligence and Machine Learning (Single Major) First 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)*	Optional 3 (Minor 2) *(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	5	6	7	8	9	10	11
1 (4.5)	I	SAMLCT1101 (T 2Cr) SAMLCP1101 (P 2Cr) 4 Credits	SAMLMT1101 (T 2Cr) SAMLMP1101 (P 2Cr) 4 Credits	SAMLMT1102 (T 2Cr) SAMLMP1102 (P 2Cr) 4 Credits	SAMLGE1101 2 Credits	SAMLSC1101 2 Credits	AECENG1101 (2Cr) ACEMIL1101 (2Cr) IKSXXX1101 (2Cr) 6 Credits		22	44
	II	SAMLCT1151 (T 2Cr) SAMLCP1151 (P 2Cr) 4 Credits	SAMLMT1151 (T 2Cr) SAMLMP1151 (P 2Cr) 4 Credits	SAMLMT1152 (T 2Cr) SAMLMP1152 (P 2Cr) 4 Credits	SAMLGE1151 2 Credits	SAMLSC1151 2 Credits	AECENG1151 (2Cr) ACEMIL1151 (2Cr) VECCOI1151 (2Cr) *Constitution of India* 6 Credits		22	
	Cum. Cr.	08	08	08	04	04	08	04	44	

***Exit option*: UG Certificate in Opt 1, Opt 2 and Opt 3 on completion of 44 credits** and additional **4 credits from NSQF / Internship**

Abbreviations:

1. **DSC:** Department/Discipline Specific Core (Major)
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
18. **AML :**Artificial Intelligence and Machine Learning

B. Sc. AI and ML First Year Semester I *(Level 4.5)*

Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SAMLCT1101	Python Fundamentals	02	--	**04**	02	--
	SAMLCP1101	Python Fundamentals (P)	-	02			04
Optional 2	SAMLMT1101	RDBMS	02	--	**04**	02	--
	SAMLMP1101	RDBMS(P)	-	02			04
Optional 3	SAMLMT1102	Digital Electronics and Computer Organization	02	--	**04**	02	--
	SAMLMP1102	Digital Electronics and Computer Organization(P)	-	02			04
Generic Electives *(from other Faculty)*	SAMLGE1101	Intellectual Property Rights **(Basket 3)**	02	--	**02**	02	--
Skill Based Course (related to Major)	SAMLSC1101	Data Handling with Excel	--	02	**02**	--	04
Ability Enhancement Course	AECENG1101	L1 – Compulsory English	02	--	**02**	02	--
Indian Knowledge System (IKS)	IKSXXX1101	Select from **Basket 5**	02	--	**02**	02	--
Ability Enhancement Course (MIL)	**ACEMIL1101**		02	--	**02**	02	--
Total Credits			**14**	**08**	**22**	**14**	**16**

B. Sc. AI and ML First Year Semester I *(Level 4.5)*

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			
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)	CA (8)	ESA (9)	
Optional 1	SAMLCT1101	Python Fundamentals	10	10	10	40	--	--	50
	SAMLCP1101	Python Fundamentals (P)	--	--	--	--	20	30	50
Optional 2	SAMLMT1101	RDBMS	10	10	10	40	--	--	50
	SAMLMP1101	RDBMS(P)	--	--	--	--	20	30	50
Optional 3	SAMLMT1102	Digital Electronics and Computer Organization	10	10	10	40	--	--	50
	SAMLMP1102	Digital Electronics and Computer Organization(P)	--	--	--	--	20	30	50
Generic Elective	SAMLGE1101	Intellectual Property Rights **(Basket 3)**	10	10	10	40	--	--	50
Skill Based Course	SAMLSC1101	Data Handling with Excel	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1101	**L1 – Compulsory English**	10	10	10	40	--	--	50
Indian Knowledge System	IKSXXX1101	Title **(Basket 5)**	10	10	10	40	--	--	50
Ability Enhancement Course (MIL)	**ACEMIL1101**		10	10	10	40	--	--	50

B. Sc. AI and ML First Year Semester II *(Level 4.5)*

Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SAMLCT1151	OOPS with Java	02	--	04	02	--
	SAMLCP1151	OOPS with Java (P)	-	02			04
Optional 2	SAMLMT1151	Computer Network	02	--	04	02	--
	SAMLMP1151	Computer Network (P)	-	02			04
Optional 3	SAMLMT1152	Fundamental of Statistics	02	--	04	02	--
	SAMLMP1152	Fundamental of Statistics(P)	-	02			04
Generic Electives *(from other Faculty)*	SAMLGE1151	Logical Reasoning **(Basket 3)**	02	--	02	02	--
Skill Based Course (related to Major)	SAMLSC1151	Data Analysis with Excel	--	02	02	--	04
Ability Enhancement Course	AECENG1151	L1 – Compulsory English	02	--	02	02	--
Value Education Courses (VEC)	VECCOI1151	Constitution of India **Basket 5**	02	--	02	02	--
Ability Enhancement Course (MIL)	**ACEMIL1151**		02	--	02	02	--
Total Credits			**14**	**08**	**22**	**14**	**16**

B. Sc. AI and ML First Year Semester II *(Level 4.5)*

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			
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)	CA (8)	ESA (9)	
Optional 1	SAMLCT1151	OOPS with Java	10	10	10	40	--	--	50
	SAMLCP1151	OOPS with Java (P)	--	--	--	--	20	30	50
Optional 2	SAMLMT1151	Computer Network	10	10	10	40	--	--	50
	SAMLMP1151	Computer Network (P)	--	--	--	--	20	30	50
Optional 3	SAMLMT1152	Fundamental of Statistics	10	10	10	40	--	--	50
	SAMLMP1152	Fundamental of Statistics(P)	--	--	--	--	20	30	50
Generic Elective	SAMLGE1151	Logical Reasoning **(Basket 3)**	10	10	10	40	--	--	50
Skill Based Course	SAMLSC1151	Data Analysis with Excel	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1151	**L1 – Compulsory English**	10	10	10	40	--	--	50
Value Education Courses (VEC)	VECCOI1151	Constitution of India **Basket 5**	10	10	10	40	--	--	50
Ability Enhancement Course (MIL)	**ACEMIL1151**		10	10	10	40	--	--	50

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLCT1101	Python Fundamentals	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLCT1101	Python Fundamentals	10	10	10	40	--	--	50

SAMLCT1101: ***Python Fundamentals (Major 1) Curriculum Details***

Course pre-requisite:

1. Basic knowledge of computers

Course Objectives:

- To define the structure and components of a Python program.
- To understand programming constructs in Python.
- To acquire Object Oriented Skills in Python.

Course Outcomes:

Students will be able to:

- Write programs using Python programming constructs.
- Design and Develop applications using Python programming.
- Design object oriented programs with Python classes.

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 Python**	**10**
	1.1	Python Introduction	
	1.2	History of Python	
	1.3	Application area of Python	
	1.4	Introduction to Python Interpreter	
	1.5	Algorithms	
	1.6	Flowcharts and Pseudo-codes, implementation of algorithms	
	1.7	Problem solving using computers.	
	1.8	Python variable declaration	
	1.9	Keywords	
	1.10	Python input/output operations	
2.0		**Python Basic**	**5**
	2.1	Python's Operators Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator precedence.	
	2.2	Python's Built-in Data types String, List, Tuple, Set, Dictionary (characteristics and methods)	
3.0		**Conditional Statements & Loop Statements**	**8**
	3.1	If Statement	
		If- else Statement	
		Nested if –else Statement	
		If-elif-else Statement	
	3.2	Loop Statement	
		For Loop	
		While Loop	
		Nested loops	

		Break, Continue, Pass statements	
4.0		**Function in python**	**7**
	4.1	Introduction to functions	
	4.2	Function definition and calling	
	4.3	Function parameters	
	4.4	Default argument function	
	4.5	Variable argument function	
	4.6	in built functions in python	
	4.7	Scope of variable in python	
	4.8	Files: Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files. Introduction to modules-Creating and using Modules, standard library modules, Importing modules in python program	
		Total	**30**

Reference Books:

1. Learning Python Mark Lutz O'Reilly 5th edition
2. Starting Out with Python plus My Programming Lab Tony Gaddis Pearson eText --Access Card Package 3rd edition
3. Programming in Python By Dr. Pooja Sharma · 2017
4. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705
5. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st edition, ISBN10: 8131705625, ISBN-13: 978-8131705629 Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645
6. Python Programming: A modular approach, Taneja Sheetal and Kumar Naveen, First edition, Pearson India, 2017, ISBN: 978-9332585348

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLCP1101	Python Fundamentals (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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLCP1101	Python Fundamentals (practical)	--	--	--	--	30	20	50

SAMLCP1101: Python Fundamentals *(practical) (Major 1)*

Note - Conduct 15 practical's on given Syllabus

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLMT1101	Introduction to RDBMS	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLMT1101	Introduction to RDBMS	10	10	10	40	--	--	50

SAMLMT1101: *Introduction to RDBMS (Major 1) Curriculum Details*

Course pre-requisite:

1. Basic knowledge about DBMS

Course Objectives:

- To understand the features of Relational database.
- To use SQL- the standard language of relational databases for database operations.
- To understand the functional dependencies and design of the databases.

Course Outcomes:

Students will be able to:

- Design and implement a database schema for a given problem-domain using data model
- Understand the use of Structured Query Language (SQL) and learn SQL syntax for writing queries.
- Apply normalization techniques to normalize the databases.

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 DBMS**	**7**
	1.1	Introduction to DBMS and Purpose of Database Systems,	
	1.2	Database-System Applications, Data Abstraction and Database System Structure	
	1.3	Structure of relational databases, Domains, Relations	
	1.4	Keys – Super key, Candidate key, Primary key, Foreign key	
	1.5	Relational algebra	
	1.6	Basic Concepts of ER model	
	1.7	Entity Set, Relationship Sets and Weak Entity Sets	
	1.8	Mapping Cardinalities, E-R diagrams, Extended E-R Features	
2.0		**Relational Database Design**	**8**
	2.1	CODD's Rules	
	2.2	Relational Integrity: Domain, Referential Integrities, Enterprise Constraints	
	2.3	Features of Good Relational Designs	
	2.4	Normalization, Atomic Domains and First Normal Form	
	2.5	Decomposition using Functional Dependencies	
	2.6	2NF, 3NF, and BCNF	
3.0		**Basics of SQL**	**10**
	3.1	DDL, DML, DCL, Structure: Creation, Alteration	
	3.2	Defining constraints – Primary key, Foreign key, Unique key, Not null, Check	
	3.3	IN operator,	
	3.4	Functions - Aggregate Functions, Built-in Functions – Numeric, Date, String Functions	
	3.5	Set operations, sub-queries, correlated sub queries	
	3.6	Use of group by, having, order by	
	3.7	Join and its types	
	3.8	Exist, Any, All	
	3.9	View and its types	
4.0		**Transaction control commands and PL/SQL Concepts**	**5**
	4.1	Commit, Rollback, Save-point	
	4.2	Cursors	
	4.3	Stored Procedures	
	4.4	Stored Function	
	4.5	Database Triggers	
		Total	**30**

Reference Books:

1. A. Silberschatz, H.F. Korth and S. Sudarshan , —Database System Concepts‖, McGraw Hill, 6th Edition.
2. C.J. Date, A. Kannan, S. Swamynathan —An introduction to Database Systems‖, Pearson, 8th Edition
3. "Oracle Database 10g PL/SQL Programming" by Scott Urman , Ron Hardman, MichaleMc Laughlin, Oracle Press, TMH, ISBN-0-07-059779-0.
4. "Oracle Database 10g The Complete Reference" By Kevin Loney, Bob Bryla
5. Oracle SQL, PL/SQL the programming language of ORACLE 4th Edition by Ivan Bayross.

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLMP1101	Introduction to RDBMS	--	04	--	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLMP1101	Introduction to RDBMS	--	--	--	--	20	30	50

SAMLMP1101: ***Introduction to RDBMS (Major 1) Curriculum Details***

Note: - Conduct 15 practical on given contents.

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLCT1102	Digital Electronics and Computer Organization	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLCT1102	Digital Electronics and Computer Organization	10	10	10	40	--	--	50

SAMLCT1102: ***Digital Electronics and Computer Organization (Major 1) Curriculum Details***

Course pre-requisite:

2. Basic Science concepts

Course Objectives:

- To understand basic concepts of digital electronics
- To study basic computer organization

Course Outcomes:

Students will be able to:

- Solve problems on Number systems and their representation
- Familiarize with logic gates and applications in combinational and sequential circuits
- Comprehend the functional units of computer architecture
- Knowledge of microprocessor and microcontroller

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

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Number Systems and Digital Codes**	**5**
	1.1	Features of Digital Systems, Number Systems: Decimal, Binary, Octal, Hexadecimal & their inter conversions	
	1.2	Representation of Data: Signed Magnitude, one's complement & two's complement , Binary Arithmetic	
	1.3	Codes: BCD, Excess -3, Gray code, alphanumeric codes (ASCII, EBCDIC, UNICODE)	
	1.4	Error detecting and error correcting codes.	
2.0		**Boolean Algebra and Combinational Circuits**	
	2.1	Basic gates (AND, OR, NOT gates), Universal gates (NAND and NOR gates),	

	2.2	other gates (XOR, XNOR gates). Boolean identities, De Morgan Laws.	**10**
	2.3	Half adder, full adder, half subtractor, full subtractor, n bit binary adder	
	2.4	Multiplexers and demultiplexers, encoders, decoders	
3.0		**Sequential Circuits**	**10**
	3.1	Introduction to sequential circuits. Difference between combinational circuits and sequential circuits	
	3.2	Flip flops (RS, Clocked RS, D, JK, T), Shift registers and their types,	
	3.3	Counters: Synchronous and Asynchronous counters.	
4.0			**5**
	4.1	Block diagram of computer,	
	4.2	Function of CPU, ALU, CU, system Buses,	
	4.3	CPU organization, instruction cycle, stack organization, need of I/O interface,	
	4.4	concepts of polling, interrupts, DMA	
	4.5	Primary Memory and Secondary Memory	
	4.6	Introduction of Microprocessor, Features of Pentium based microprocessors	
	4.7	Data bus, Address bus, Speed, Addressable memory capacity, cache memory, Introduction to microcontrollers	
		Total	**30**

Reference Books:

1. Digital Electronics: R.P. Jain, Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata Mc Graw Hill
3. Digital Fundamentals: Floyd, Jain R.P., Pearson Education
4. Computer System Architecture: Morris Mano, Prentice Hall of India
5. Computer Organisation and Architecture: William Stallings, Prentice Hall of India

E-Books and Online Learning Material

1. Digital Electronics: A.P. Godse, D.A. Godse, Technical Publications
2. Digital Electronics Principles, Devices and Applications: Anil K. Maini, Wiley
3. A practical introduction to computer architecture: Daniel Page, Springer
4. https://nptel.ac.in/courses/106/103/106103068/#
5. https://nptel.ac.in/courses/106/105/106105163/

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLCP1102	Digital Electronics and Computer Organization	--	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLCP1102	Digital Electronics and Computer Organization	--	--	--	--	30	20	50

SAMLCP1102: Digital Electronics and Computer Organization *(practical) (Major 1)*

1. Familiarization with Computer System and its peripheral devices
2. Familiarization with different Operating System
3. Practice of internal and external commands of DOS
4. Working practice on windows operating system: creating file, folder. Copying, moving, deleting file, folder
5. Installing and uninstalling of new software using control panel.

6. Installation and uninstallation of new hardware drivers using control panel.
7. Disk defragmentation using system tool
8. Procedure of disk partition and its operation (Shrinking, Extending, Delete, Format).
9. Installation of Operating Systems
10. Changing resolution, colour, appearances, and screensaver option of the display
11. Changing System Date and Time.
12. User Account creation and its feature on Windows Operating System
13. Email Account creation, reading, writing and sending emails with attachments.
14. Internet browsing using browsers.
15. Using of Search Engine to get information from internet

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLGE1101	Intellectual Property Rights	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLGE1101	Intellectual Property Rights	10	10	10	40	--	--	50

SAMLGE1101: *Intellectual Property Rights (Major 1) Curriculum Details*

Course pre-requisite:

1. Basic understanding of Intellectual Properties, Patents, Trademarks, Copyrights and designs

Course Objectives:

- To make the students aware of their rights for the protection of their invention done in their project work.
- To get registration in our country and foreign countries of their invention, designs and thesis or theory
- to identify the different types of IPR's.

Course Outcomes:

Students will be able to:

- Get awareness of acquiring the patent
- Learn to have copyright for their innovative works.
- Get the knowledge of plagiarism in their innovations which can be questioned legally

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 IPR**	**8**
	1.1	Meaning of property	
	1.2	Origin, Nature, Meaning of Intellectual Property Rights	
	1.3	Kinds of Intellectual property rights	
2.0		**Patent Rights and Copy Rights**	**7**
	2.1	Origin, Meaning of Patent	
	2.2	Types, Inventions which are not patentable	
	2.3	Registration Procedure	
	2.4	Rights and Duties of Patentee	
3.0		**Copy Rights and Trade Mark**	**8**
	3.1	Definition &Types of Copy Right	
	3.2	Registration procedure	
	3.3	Meaning & Nature of Trade Marks	
	3.4	Types, Registration of Trade Marks	
4.0		**Design**	**7**
	4.1	Definition, Object, Registration of Design	
	4.2	Cancellation of Registration	
	4.3	International convention on design	
	4.4	Functions of Design	
		Total	**30**

ReferenceBooks:

1. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy
2. Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B.L.Wadehra
3. IPR by P. Narayanan
4. Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLSC1101	Data Handling with Excel	--	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLSC1101	Data Handling with Excel	--	--	--	--	30	20	50

SAMLSC1101: ***Data Handling with Excel (Skill Based Course) Curriculum Details***

Course pre-requisite:

3. Basic knowledge of computers

Course Objectives:

- To understand the basic and intermediate features of Microsoft Excel.
- To learn how to organize, manage, and manipulate data efficiently.
- To master the use of Excel for everyday data handling tasks.
- To gain proficiency in creating and managing Excel workbooks, worksheets, and data validation.

Course Outcomes:

Students will be able to:

- Navigate and Utilize the Excel Interface Efficiently
- Enter, edit, and manage text, numbers, and dates within Excel spreadsheets
- Apply and manage filters to display specific data subsets based on criteria
- Write and use basic arithmetic formulas and cell references (relative, absolute, mixed).
- Apply common Excel functions such as SUM, AVERAGE, IF, and COUNT to manipulate and summarize 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 to Excel and Data Entry**	**7**
	1.1	**Overview of Excel Interface**	
	1.2	**Data Entry Basics**	
	1.3	**Data Formatting, Basic Workbook and Worksheet Management**	
	1.4	**Autofill and Series, Basic Cell Referencing**	
2.0		**Data Management and Organization**	**8**
	2.1	**Data Editing**	
	2.2	**Advanced Data Formatting**	
	2.3	**Cell Styles**	
	2.4	**Data Validation**	
	2.5	**Working with Multiple Sheets**	
3.0		**Formulas and Functions for Data Handling**	**8**
	3.1	Basic Functions	
	3.2	Logical Functions	
	3.3	Lookup and Reference Functions	
	3.4	Creating Formulas	
	3.5	Formula Auditing	
4.0		**Advanced Data Handling Techniques**	**7**
	4.1	Importing and Exporting Data	
	4.2	Working with Large Datasets	
	4.3	Data Protection and Security	
	4.4	Introduction to Macros for Data Handling	
		Total	**30**

Reference Books:

1. Microsoft Excel 2019 Bible by Michael Alexander, Richard Kusleika, and John Walkenbach
2. Excel 2019 All-in-One for Dummies by Greg Harvey
3. Excel Formulas and Functions for Dummies" by Ken Bluttman

SAMLSC1101: Data Handling with Excel (Skill Based Course)

1. Perform a practical on navigating the Excel interface.
2. Perform a practical on basic data entry in Excel.
3. Perform a practical on formatting cells in Excel.
4. Perform a practical on managing worksheets in Excel.
5. Perform a practical on sorting data in Excel.
6. Perform a practical on filtering data in Excel.
7. Perform a practical on custom sorting in Excel.
8. Perform a practical on applying data validation and creating drop-down lists in Excel.
9. Perform a practical on linking data across multiple sheets in Excel.
10. Perform a practical on consolidating data from multiple sheets in Excel.
11. Perform a practical on creating and using basic arithmetic formulas in Excel.
12. Perform a practical on using text functions in Excel.
13. Perform a practical on applying logical functions in Excel.
14. Perform a practical on using aggregation functions in Excel.
15. Perform a practical on using date functions in Excel.

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLCT1151	OOPS with Java	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLCT1151	OOPS with Java	10	10	10	40	--	--	50

SAMLCT1101: *OOPS with JAVA (Major 1) Curriculum Details*

Course pre-requisite:

1. Basic knowledge of C programming language
2. Basic knowledge of RDBMS

Course Objectives:

- To understand the basic concepts and fundamentals of platform independent object oriented language.
- To demonstrate skills in writing programs using exception handling techniques and java 8 features.
- To understand streams and efficient user interface design techniques.

Course Outcomes:

Students will be able to:

- Use the syntax and semantics of java programming language and basic concepts of OOP.
- Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages
- Apply the concepts of Exception handling to develop efficient and error free codes.

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

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Java Fundamentals**	
	1.1	Java History and Java Architecture	**6**
	1.2	Java Program Structure	
	1.3	Command Line Arguments	
	1.4	Data Types and Variables	
	1.5	Flow Control Statements	
	1.6	Arrays	
2.0		**OOPS**	
	2.1	Classes and Objects	**10**
	2.2	Static members	
	2.3	Constructors	
	2.4	Encapsulation	
	2.5	Inheritance	
	2.6	this and super keyword	
	2.7	Polymorphism	
3.0		**Abstraction and Packages**	
	3.1	Abstract class and Abstract Methods	**4**
	3.2	Interfaces	
	3.3	Final Keyword	
	3.4	System Packages and User defined Packages	
4.0		**Exception Handling, Strings and Collections**	
	4.1	Try, catch block and finally clause	**10**
	4.2	User defined exceptions	
	4.3	String and StringBuffer class	
	4.4	ArrayList	
	4.5	Generics and Iterator	
	4.6	TreeSet and HashSet	
	4.7	HashMap	
		Total	**30**

ReferenceBooks:

1. Java The Complete Reference 9th Edition, Herbert Schildt, McGraw Hill Education
2. (India) Private Limited, New Delhi.
3. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI
4. Introduction to Java programming, By Y.DanielLiang,Pearson Publication
5. An introduction to Java programming and object oriented application development, R. A. Johnson-Thomson

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLCP1151	OOPS with Java	--	04	--	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)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLCP1151	OOPS with Java	--	--	--	--	20	30	50

SAMLCP1151: *OOPS with JAVA (Major 1) Curriculum Details*

Note: - Conduct 15 practical on given contents.

Course Structure: *Minor 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLMT1151	Computer Network	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)			
		Test I (4)	Test II (5)	Avg of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLMT1151	Computer Network	10	10	10	40	--	--	50

SAMLMT1151: *Computer Network (Minor 1) Curriculum Details*

Course pre-requisite:

1. Basic handling knowledge about Computers.
2. Basics about Computer Applications.

Course Objectives:

- Introduction fundamental concepts of computer networking.
- Introduce students with various concepts used in network
- Introduce various technologies and standards
- Allow the student to gain expertise in areas of networking

Course Outcomes:

Students will be able to:

- After completing this course the student get the knowledge and ability to:
- Understand basic computer network technology.
- Students can identify the different types of network topologies and protocols.
- Students can Identify the different types of network standards

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

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Basics of Computer Network**	**8**
	1.1	Computer Networking	
	1.2	Signals — Analog and Digital Signals	
	1.3	Parallel and Serial Transmission Mode	
	1.4	Data Transmission Media	
	1.5	Network topologies- BUS, STAR, RING, MESH	
	1.6	Network Types: LAN, MAN, WAN	
2.0		**Network Architecture and IP Address**	**7**
	2.1	Network Standards, Ethernet, Types of Ethernet	
	2.2	Client and Server Architecture	
	2.3	Internet verses Intranet	
	2.4	Connection Oriented & Connectionless Services	
	2.5	IP-address Classes	
	2.6	IPV4 vs IPV6	
3.0		**Protocols and Network Models**	**8**
	3.1	Network protocol: TCP/IP, SMTP	
	3.2	DHCP and DNS	
	3.3	OSI/ISO Reference Model	
	3.4	TCP/IP Reference Model	
	3.5	Switching - Circuit Switching, Packet Switching, Message Switching	
4.0		**Networking Devices and Advanced Networking**	**7**
	4.1	Network Devices - NIC Cards, Switch, Repeaters, Bridges, Gateways, Router.	
	4.2	WiFi vs WiMax	
	4.3	Cloud Computing	
	4.4	Internet Of Things (IOT)	
		Total	**30**

Reference Books:

1. Andrew S. Tannenbaum,"Computer Networks", (Third Edition), Prentice-Hall of India Pvt. Ltd, New Delhi.
2. Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill.
3. Gerd E. Keiser", Local Area Networks", Tata McGraw Hill Edition, New Delhi.

Course Structure: *Minor 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLMP1151	Computer Network	--	04	--	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)			
		Test I (4)	Test II (5)	Avg of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLMP1151	Computer Network	--	--	--	--	20	30	50

SAMLMP1151: *Computer Network (Minor 1) Curriculum Details*

Note: - Conduct 15 practical on given contents.

Course Structure: *Minor 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLMT1152	Fundamental of Statistics	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)			
		Test I (4)	Test II (5)	Avg of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLMT1152	Fundamental of Statistics	10	10	10	40	--	--	50

SAMLMT1152: *Fundamental of Statistics (Minor 1) 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:

- 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**	**7**
	1.1	Definition of Statistic	
	1.2	Importance & Limitation of Statistics	
	1.3	Scope of Statistics (Computer Science, Industry, Economics)	
	1.4	Collection of data	
	1.5	Frequency Distribution	
	1.6	Discrete & Continues variable	
2.0		**Measures of central Tendency**	**8**
	2.1	Concept	
	2.2	Mean Definition ,formulae, Numerical example	
	2.3	Median Definition ,formulae, Numerical example	
	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**	**7**
	3.1	Concept	
	3.2	Types of correlation	
	3.3	Karl Pearson's coefficient of correlation	
	3.4	Numerical examples	
	3.5	Regression	
	3.6	Regression equations/line	
	3.7	Numerical examples	
4.0		**Probability**	**8**
	4.1	Definition	
	4.2	Sample space, Event, Types of event	
	4.3	Permutation & Combination	
	4.4	Theorems of probability a. $P(A)=1-P(A')$ b. $0 \leq P(A) \leq 1$ c. $P(A \cup B)=P(A)+P(B)-P(A \cap B)$	
	4.5	Examples	
		Total	**30**

TextBooks:

1. "STATISTICAL METHODS" III Edition (2001) S P Gupta & Kapoor
2. "Business Statistics" II Edition (2005) Gupta and Kapoor

Reference Books:

1. Foundation of Mathematics statistics – S. C. Gupta & V. K. Kapoor
2. Statistical methods – S. C. Gupta.

Course Structure: *Minor 1 -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLMP1152	Fundamental of Statistics	--	04	--	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)			
		Test I (4)	Test II (5)	Avg of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLMP1152	Fundamental of Statistics	--	--	--	--	20	30	50

SAMLMP1152: *Fundamental of Statistics (Minor 1) Curriculum Details*

Note: - Conduct 15 practical on given contents.

Course Structure: *Generic Electives -Teaching Scheme*

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLGE1151	Logical Reasoning	02	--	02	--	02

Generic Electives -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLGE1151	Logical Reasoning	10	10	10	40	--	--	50

SAMLGE1151: Logical Reasoning (Generic Electives) Curriculum

Course pre-requisite:

1. Basic knowledge of English
2. Basic knowledge of Numbers.
3. Basic knowledge of general knowledge.

Course Objectives:

- This course enables students to develop their ability to reason by introducing them to elements of reasoning
- Basics knowledge of different types of Series
- Study of Coding and Decoding
- Knowledge of Blood Relations, Directions and Puzzles

Course Outcomes:

- Develops ability to think logically of student
- Understanding Relations, Directions, Arrangements, Logics, Puzzles.
- Improves Mental Alertness
- Construct a logically sound and well-reasoned argument

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Series, Analogy**	**8**
	1.1	Types of series	
	1.2	Alphabet series	
	1.3	Alpha numeric	
	1.4	Completing the Analogous Pair	
	1.5	Direct/Simple Analogy	
	1.6	Choosing the Analogous Pair	
	1.7	Double Analogy	
	1.8	Number analogy	
2.0		**Direction Sense Test**	**8**
	2.1	Problems based on angular changes in direction	
	2.2	Problems on Shadows	
	2.3	General Problems based on Pythagoras Theorem	
3.0		**Coding-Decoding**	**7**
	3.1	Letter coding	
	3.2	Direct Letter Coding	
	3.3	Number/Symbol Coding	
4.0		**Blood Relation**	**7**
	4.1	Concepts of deciphering relations based problems	
	4.2	Problems on deciphering jumbled up descriptions	
	4.3	Relation puzzle	
	4.3	Coded relations.	
		Total	**30**

Reference Books:

1. Data Structure by Seymour Lipschutz MC GRAWHILL
2. Data Structures And Algorithms Concepts, Techniques And Applications G.A.V. Pai MC GRAWHILL

Course Structure: *Major 1 -Teaching Scheme*

Course Code	Course Name	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SAMLSC1151	Data Analysis with Excel (P)	--	02	--	02	02

Major 1 -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total Col (8+9)] (10)
		CA			ESA (7)			
		Test I (4)	Test II (5)	Avg. of T1 & T2 (6)		CA (8)	ESA (9)	
SAMLSC1151	Data Analysis with Excel (P)	--	--	--	--	30	20	50

SAMLSC1151: ***Data Analysis with Excel (Major 1) Curriculum Details***

Course pre-requisite:

1. Basic knowledge of the Microsoft Windows operating system and Office.

Course Objectives:

- Explore and extend a classic Excel dashboard.
- Explore and extend an Excel data model.
- Pre-format and import a .CSV file.
- Import data from a SQL Server database
- Import data from a report.
- Create measures using advanced DAX functions.
- Create data visualizations in Excel.

Course Outcomes:

Students will be able to:

- Understand and apply data analysis techniques using Excel.
- Clean, organize, and prepare data for analysis in Excel.
- Conduct basic statistical analysis with Excel functions.
- Create and interpret data visualizations in Excel.

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

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Data Analysis in Excel**	**6**
	1.1	Classic Data Analysis with Excel	
	1.2	Excel Pivot Tables	
	1.3	Limitations of Classic Data Analysis	
2.0		**The Excel Data Model**	**4**
	2.1	Using an Excel Data Model	
	2.2	DAX	
3.0		**Importing Data from Databases & Excel Reports**	**10**
	3.1	Importing Data into Excel	
	3.2	Shaping and Transforming Data	
	3.3	Loading Data	
	3.4	Available Data Sources	
	3.5	Previewing, Shaping, and Transforming Data	
	3.6	Table Relationships and Hierarchies	
	3.7	Importing Data from Excel Reports	
	3.8	Transforming Excel report Data	
4.0		**Creating and Formatting Measures & Visualizing Data in Excel**	**10**
	4.1	Measures	
	4.2	Advanced DAX Functions	
	4.3	Pivot Charts	
	4.4	Cube Functions	
	4.5	Charts for Cube Functions	

SAMLSC1151: **Data Analysis with Excel (Skill Based Course)**
(practical) (Major 1)

- Perform a practical on cleaning and organizing raw data in Excel.
- Perform a practical on handling missing data and duplicates in Excel.
- Perform a practical on calculating descriptive statistics using Excel functions.
- Perform a practical on creating histograms and frequency distributions.
- Perform a practical on conducting correlation analysis in Excel.
- Perform a practical on generating and interpreting PivotTables.
- Perform a practical on creating and customizing Pivot Charts.
- Perform a practical on using VLOOKUP and HLOOKUP for data retrieval.
- Perform a practical on applying INDEX-MATCH for complex lookups.
- Perform a practical on using Excel's IF and nested IF functions for data analysis.
- Perform a practical on creating dynamic charts and graphs using Excel.
- Perform a practical on recording and running macros to automate data tasks.
- Perform a practical on importing data from external sources (CSV, databases) into Excel.
- Perform a practical on building interactive dashboards in Excel.
- Perform a practical on generating and exporting professional reports from Excel.

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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