॥ 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/विवत्रंविपदवी/२०२५–२६/126
दिनांक १२.०६.२०२५

सहाय्यक कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत : माहितीस्तव तथा कार्यवाहीस्तव.

१) मा. कुलगुरू महोदयांचे कार्यलय, प्रस्तुत विद्यापीठ.
२) मा. प्र. कुलगुरू महोदयांचे कार्यलय, प्रस्तुत विद्यापीठ.
३) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
४) मा. संचालक, परीक्षा व मुंल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
५) मा. प्राचार्य, सर्व संबधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
६) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, परिपत्रक अभ्यासक्रम संकेतस्थळावर प्रसिध्द करण्यात यावेत.

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

(Credit Framework and Structure of

B. Sc. Software Development (Single Major)

Second Year

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

UNDERGRADUATE PROGRAMME OF

SCIENCE & TECHNOLOGY

Major in **SFD** 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)

Credit Framework for Second Year with Multiple Entry and Exit

Subject: SFD (Major) /DSM (Minor 1)

B.Sc. Software Development (Single Major) Second Year

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
2 (5.0)	III	SSFDCT1201 (T 2Cr) SSFDCT1202 (T 2Cr) SSFDCP1203 (P 2Cr) SSFDCP1204 (P 2Cr) 8 Credits	SSFDMT1201 (T 2Cr) SSFDMP1201 (P 2Cr) 4 Credits	--	SSFDGE1201 2 Credits	SSFDSC1201 2 Credits	AECENG1201 (2cr) AECMIL1201 (2Cr) (MAR/HIN/URD /KAN/PAL) 4 Credits	CCCXXX1201 (2Cr) *(NCC/NSS/SPT(sports)/ CLS(Cultural Studies)/HWS(Health Wellness)/ YGE(Yoga Education) / FIT(Fitness)* 2 Credits	22	44
	IV	SSFDCT1251 (T 2Cr) SSFDCT1252 (T 2Cr) SSFDCP1253 (P 2Cr) SSFDCP1254 (P 2Cr) 8 Credits	SSFDMT1251 (T 2Cr) SSFDMP1251 (P 2Cr) 4 Credits	--	SSFDGE1251 2 Credits	SSFDVC1251 2 Credits	AECENG1251 (2cr) AECMIL1251 (2Cr) (MAR/HIN/URD /KAN/PAL) VECEVS1251 (2Cr) 6 Credits		22	
	Cum. Cr.	16	08	00	04	04	10	02	44	

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. **SFD**: Software Development

B. Sc. SD 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	SSFDCT1201	Java Programming	02	--	**08**	03	--
	SSFDCT1202	Computer Network	02	--		03	--
	SSFDCP1203	Java Programming(P)	--	02		--	04
	SSFDCP1204	Computer Network (P)	--	02		--	04
Optional 2	SSFDMT1201	Software Engineering	02	--	**04**	03	--
	SSFDMP1201	Software Engineering (P)	-	02		--	04
Generic Electives *(from other Faculty)*	SSFDGE1201	Intellectual Property Right	02	--	**02**	02	--
Skill Based Course (related to Major)	SSFDSC1201	JavaScript (P)	--	02	**02**	--	04
Ability Enhancement Course	AECENG1201	Select from **(Basket 4)**	02	--	**02**	02	--
Ability Enhancement Course	AECMIL1201	Select from **(Basket 4)**	02	--	**02**	02	--
Field Work / Project/Internship	--	--	--	--	--	--	--
Community Engagement Services (CES)	CCCXXX1201	Select from **(Basket 6)**	--	02	**02**	--	02
Total Credits			**12**	**10**	**22**	**15**	**18**

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

Examination Scheme

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

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	SSFDCT1201	Java Programming	10	10	10	40	--	--	50
	SSFDCT1202	Computer Network	10	10	10	40	--	--	50
	SSFDCP1203	Java Programming(P)	--	--	--	--	20	30	50
	SSFDCP1204	Computer Network (P)	--	--	--	--	20	30	50
Optional 2	SSFDMT1201	Software Engineering	10	10	10	40	--	--	50
	SSFDMP1201	Software Engineering (P)	--	--	--	--	20	30	50
Generic Elective	SSFDGE1201	Intellectual Property Right	10	10	10	40	--	--	50
Skill Based Course	SSFDSC1201	JavaScript (P)	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1201	Select from **(Basket 4)**	10	10	10	40	--	--	50
Ability Enhancement Course	AECMIL1201	Select from **(Basket 4)**	10	10	10	40	--	--	50
Field Work / Project/Internship	SSFDFP1201	Mini Project	--	--	--	--	20	30	50
Community Engagement Services (CES)	CCCXXX1201	Select from **(Basket 6)**	--	--	--	--	20	30	50

B. Sc. SD 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	SSFDCT1251	Web Development using J2EE	02	--	**08**	03	--
	SSFDCT1252	Data Structure and Algorithms	02	--		03	--
	SSFDCP1253	Web Development using J2EE (P)	--	02		--	04
	SSFDCP1254	Data Structure and Algorithms (P)	--	02		--	04
Optional 2	SSFDMT1251	Software Testing	02	--	**04**	03	--
	SSFDMP1251	Software Testing (P)	-	02		--	04
Generic Electives *(from other Faculty)*	SSFDGE1251	Data Analysis with Excel	02	--	**02**	02	--
Vocational Course *(related to Major)*	SSFDVC1251	React JS (P)	--	02	**02**	--	04
Ability Enhancement Course	AECENG1251	Select from **(Basket 4)**	02	--	**02**	02	--
Ability Enhancement Course	AECMIL1251	Select from **(Basket 4)**	02	--	**02**	02	--
Value Education Courses	VECEVS1251	Select from **(Basket 5)**	02	--	**02**	02	--
Community Engagement Services (CES)	--	--	--	--	--	--	--
Total Credits			**14**	**08**	**22**	**17**	**16**

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

Examination Scheme

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

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	SSFDCT1251	Web Development using J2EE	10	10	10	40	--	--	50
	SSFDCT1252	Data Structure and Algorithms	10	10	10	40	--	--	50
	SSFDCP1253	Web Development using J2EE (P)	--	--	--	--	20	30	50
	SSFDCP1254	Data Structure and Algorithms (P)	--	--	--	--	20	30	50
Optional 2	SSFDMT1251	Software Testing	10	10	10	40	--	--	50
	SSFDMP1251	Software Testing (P)	--	--	--	--	20	30	50
Generic Elective	SSFDGE1251	Data Analysis with Excel	10	10	10	40	--	--	50
Vocational Course	SSFDVC1251	React JS (P)	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1251	Select from **(Basket 4)**	10	10	10	40	--	--	50
Ability Enhancement Course	AECMIL1251	Select from **(Basket 4)**	10	10	10	40	--	--	50
Value Education Courses	VECEVS1251	Select from **(Basket 5)**	10	10	10	40	--	--	50
Community Engagement Services (CES)	CCCXXX1251	Select from **(Basket 6)**	--	--	--	--	20	30	50

Detailed Curriculum

SEM-III

Course Structure:

Major 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDCT1201	Java Programming	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)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDCT1201	Java Programming	10	10	10	40	--	--	**50**

SSFDCT1201: Java Programming (Major 1) Curriculum Details

Course pre-requisite:

1. Basic knowledge of Programming.
2. Basic knowledge of RDBMS.

Course Objectives:

1. To understand architecture of JVM.
2. To study concept of Object oriented programming.
3. To understand concept of package and exception handling.
5. To study Java 8 features.

Course Outcomes:

Students will be able to:

1. Use the syntax and semantics of java programming language and basic concepts of OOP.
2. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
3. Apply the concepts of Exception handling to develop efficient and error free codes.
4. Use java standard API library to write complex programs.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Java Fundamentals**	
	1.1	Java History and Java Architecture	**7**
	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	**8**
	2.2	Constructors and Static members	
	2.3	Encapsulation, Inheritance, this and super keyword	
	2.4	Polymorphism	
	2.5	Garbage Collection	
3.0		**Abstraction, Packages and Exception Handling**	
	3.1	Final Keyword, Abstract class & Abstract Methods	**7**
	3.2	Interfaces	
	3.3	System Packages and User defined Packages	
	3.4	Try, catch block and finally clause	
	3.5	User defined exceptions	
4.0		**String Handling and Java 8 Features**	
	4.1	String and StringBuffer class	**8**
	4.2	IO stream classes and Object Serialization	
	4.3	Default and Static methods in Interface	
	4.4	Functional Interfaces and Lambda Expressions	
	4.5	Method References and Stream API	
		Total	**30**

Reference Books:

1. Herbert Schildt, “Java The Complete Reference 9th Edition”, McGraw Hill Education (India) Private Limited, New Delhi.
2. Balaguruswamy E., “Programming with JAVA: A Primer. 7th edition”, McGraw Hill Education (India) Private Limited, New Delhi.
3. Arunesh Goyal, The Essentials of JAVA, Khanna Book Publishing Company Private Limited

Course Structure:

Major 2 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDCT1202	Computer Network	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)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDCT1202	Computer Network	10	10	10	40	--	--	**50**

SSFDCT1202: Computer Network (Major 2) Curriculum Details

Course pre-requisite:

1. Basic Understanding of Computer Systems like Operating systems basics, Input/output and device communication.
2. Basic Knowledge of Data Communication.

Course Objectives:

1. Understand How Data travels in a Networked World like grasp the principles and architecture of data communication.
2. Develop Practical Networking Skills like IP addressing and subnetting, Routing and switching basics.
3. Analyze and Solve Network-Related Problems.

Course Outcomes:

Students will be able to:

1. Describe the layered architecture of computer networks (like the OSI and TCP/IP models) and explain the function of each layer and its protocols.
2. Design small to medium-sized networks, configure devices (routers, switches), and perform subnetting, routing, and addressing.
3. Evaluate the performance, reliability, and security of a network, and recommend improvements or defences.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Basics of Computer Network**	
	1.1	Computer Networking	**8**
	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**	
	2.1	Network Standards, Ethernet, Types of Ethernet	**9**
	2.2	Client-Server vs. Peer-to-Peer Architectures	
	2.3	Software-Defined Networking (SDN)	
	2.4	IP-address Classes	
	2.5	IPV4 Vs IPv6	
	2.6	Static vs. Dynamic IP Assignment (DHCP)	
3.0		**Protocols and Network Models**	
	3.1	OSI/ISO and TCP/IP Reference Model	**7**
	3.2	HTTP/HTTPS, DNS, SMTP/POP/IMAP, FTP/SFTP	
	3.3	TCP and UDP	
	3.4	Multiplexing and de-multiplexing	
	3.5	IP, ICMP, Routing protocols	
	3.6	ARP protocol	
	3.7	Introduction to Secure Protocols: TLS/SSL, VPN protocols	
	3.8	Switching - Circuit Switching, Message Switching, Packet Switching	
4.0		**Networking Devices and Advanced Networking**	
	4.1	Network Devices - NIC Cards, Switch, Repeaters, Bridges, Router, Gateways.	**6**
	4.2	WiFi and WiMax	
	4.3	Cloud computing and Virtualization	
	4.4	Software-Defined Networking (SDN) & Network Function Virtualization (NFV)	
	4.5	Introduction to 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:

Major 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDCT1203	Java Programming (P)	--	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)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDCT1203	Java Programming (P)	--	--	--	--	20	30	**50**

SSFDCT1203: Java Programming (Major 1) Practical List

Practical No.	Title of Practical
1	Write a program to read two numbers from user and print their product.
2	Write a program to print the square of a number passed through command line arguments.
3	Write a java program to find the Factorial of a number using recursive and non-recursive functions.
4	Write a Java program for sorting a given list of marks in descending order.
5	Write a program to demonstrate constructor overloading.
6	Write a Java program to create a class Employee with a method called calculateSalary(). Create two subclasses Manager and Programmer. In each subclass, override the calculateSalary() method to calculate and return the salary based on their specific roles.
7	Write a program to demonstrate encapsulation.
8	Write a program to demonstrate final keyword.
9	Write a program to demonstrate abstract class and abstract methods.
10	Write a program to create and import a custom package.
11	Write a Java program using an interface called 'Bank' having function 'rate_of_interest()'. Implement this interface to create two separate bank classes 'SBI' and 'PNB' to print different rates of interest. Include additional member variables, constructors also in classes 'SBI' and 'PNB'.

12	Write a Java program for demonstrating the divide by zero exception handling.
13	Write a Java program that reads a list of integers from the user and throws an exception if any numbers are duplicates.
14	Write a program to demonstrate String and StringBuffer class.
15	Write a program to serialize and de-serialize object.

Course Structure:

Major 2 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDCT1204	Computer Network (P)	--	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)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDCT1204	Computer Network (P)	--	--	--	--	20	30	**50**

SSFDCT1204: Computer Network (Major 2) Practical List

Practical No.	Title of Practical
1	Study and Comparison of Analog vs Digital Signals
2	Compare transmission characteristics of coaxial, fiber optic, and twisted-pair cables through demo kits or video resources.
3	Demonstrate Ethernet cabling (Cat5/Cat6) , connectors (RJ-45) and crimping tools.
4	Configuring IP address and perform subnetting exercises using online tools or subnet calculators.
5	Manually assign IP addresses vs using DHCP on a simulated network;
6	Demonstrate to validate IP address with ipconfig, ping.
7	Simulate circuit, packet, and message switching via Packet Tracer or visual demos
8	Demonstrate VPN configuration.
9	Brief demo of routing protocol concepts via Packet Tracer.
10	Demonstrate to create shared folder on the network.
11	Demonstrate to assigning permissions to shared folder on the network.
12	Installing network printer on shared network.
13	Demonstrate remote desktop sharing.
14	Demonstrate to server level services.
15	Demonstrate cloud computing based services.

Course Structure:

Minor 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDMT1201	Software Engineering	02	--	02	--	02

Minor 1 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDMT1201	Software Engineering	10	10	10	40	--	--	**50**

SSFDMT1201: Software Engineering (Minor 1) Curriculum Details

Course pre-requisite:

1. Basic knowledge of Programming in C/C++/Java
2. Understanding of Data Structures and Algorithms
3. Familiarity with Database Management Concepts

Course Objectives:

1. To introduce the fundamental concepts of software engineering and various software process models.
2. To develop an understanding of software requirements engineering, risk analysis, and project planning techniques.
3. To expose students to design principles, modeling techniques, software testing strategies, and quality management practices.

Course Outcomes:

Students will be able to:

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

1. **CO1:** Describe the role and nature of software, and explain various software development life cycle models including Agile methodologies.
2. **CO2:** Analyze and document software requirements, perform risk analysis, and prepare effective project plans.
3. **CO3:** Apply software design principles and use UML diagrams for modeling software systems.
4. **CO4:** Demonstrate various software testing strategies and debugging techniques to ensure software reliability.
5. **CO5:** Implement software quality assurance techniques, manage software releases, and plan for software product sustenance.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Software Engineering Fundamentals**	
	1.1	Introduction to Software Engineering	**7**
	1.2	Software Process Models: Waterfall, Iterative, Agile, Spiral	
	1.3	Software Development Life Cycle (SDLC)	
	1.4	Software Crisis and Challenges in SE	
	1.5	Role of Software Engineer	
2.0		**Requirements & Design Engineering**	
	2.1	Requirement Engineering Process	**8**
	2.2	Types of Requirements: Functional & Non-Functional	
	2.3	Feasibility Study and SRS Document	
	2.4	Design Concepts: Abstraction, Modularity, Coupling & Cohesion	
	2.5	Structured Design and Object-Oriented Design Basics	
	2.6	UML Diagrams (Use Case, Class Diagram)	
3.0		**Software Quality, Testing & Maintenance**	
	3.1	Software Quality Factors (McCall's, ISO)	**8**
	3.2	Verification vs Validation	
	3.3	Levels of Testing: Unit, Integration, System, Acceptance	
	3.4	Testing Techniques: White-box, Black-box, Automation tools	
	3.5	Maintenance Types and Challenges	
	3.6	Software Configuration Management	
4.0		**Software Project Management & Modern Trends**	
	4.1	Project Estimation: LOC, FP, COCOMO	**7**
	4.2	Project Scheduling: Gantt Charts, PERT & CPM	
	4.3	Risk Management	
	4.4	Software Documentation & Metrics	
	4.5	DevOps, Agile and CI/CD	
		Total	**30**

Reference Books:

1. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007
2. Software Engineering: Principles and Practice Hans van Vliet

Course Structure:

Minor 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDMP1201	Software Engineering (P)	--	02	--	02	02

Minor 1 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDMP1201	Software Engineering (P)	--	--	--	--	20	30	**50**

SSFDMP1201: Software Engineering (Minor 1) Practical List

Practical No.	Title of Practical
1	Draw Waterfall and Spiral Model diagrams.
2	Create a Software Development Life Cycle (SDLC) chart.
3	Prepare a list of roles and responsibilities of a Software Engineer.
4	Prepare a Software Requirement Specification (SRS) for a Library Management System.
5	Perform a Feasibility Study Report for an Online Food Delivery System.v
6	Draw a Use Case Diagram for a Hospital Management System.
7	Draw a Class Diagram for an Online Banking System.
8	Design a Data Flow Diagram (DFD) – Level 0 and 1 for a Student Management System.
9	Write test cases for Login Module of a Web Application.
10	Differentiate White Box vs Black Box Testing with examples.
11	Create a Software Quality Checklist for a project.
12	Simulate a Bug Tracking Sheet using Excel or Google Sheets.
13	Estimate project cost using COCOMO Model (Basic).
14	Draw a Gantt Chart for your mini project timeline using any tool (Excel/online).
15	Use GitHub to upload your mini project – demonstrate version control basics.

Course Structure:

Generic Electives -Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDGE1201	Intellectual Property Rights	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)	
SSFDGE1201	Intellectual Property Rights	10	10	10	40	--	--	50

SSFDGE1201**:** ***Intellectual Property Rights (Generic Electives) 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:

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:

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

Course Structure:

Skill Based Course -Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDSC1201	JavaScript (P)	--	04	--	02	02

Skill Based Course -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)	
SSFDSC1201	JavaScript (P)	--	--	--	--	20	30	50

SSFDSC1201: JavaScript (P) ***(Skill Based) Curriculum Details***

Course pre-requisite:

1. Basic knowledge of html

Course Objectives:

- To learn the usage of CSS for styling web pages.
- To use Javascript for creating dynamic and interactive web content like applications and browsers

Course Outcomes:

Students will be able to:

- Apply CSS for styling web pages
- Demonstrate the usage of JavaScript for creating dynamic and interactive web content
- Develop an interactive website using, HTML, CSS, JavaScript.

Sr. No	Unit No.
1.	Write a JavaScript program to calculate multiplication and division of two numbers (input from user).
2.	Write a javascript program to calculate average of 3 numbers.
3.	Write a JavaScript function that accepts a string as a parameter and counts the number of vowels within the string.
4.	Write a javascript program to check whether the number is odd or even
5.	Write a javascript program to print sum of n natural numbers.
6.	Write a JavaScript function that returns a passed string with letters in alphabetical order. Example string : 'admin' Expected Output : 'adimn'
7.	Write a JavaScript function that accepts a string as a parameter and converts the first letter of each word of the string in upper case.
8.	Write a JavaScript program to get the current date.
9.	Write a JavaScript program to read firstname and lastname from user and display welcome message on screen.
10.	Write a JavaScript program that accept two integers and display the larger
11.	Write a JavaScript function to remove specified number of characters from a string.
12.	Write JavaScript to demonstrate loops: while, for, do-while
13.	Write a JavaScript program to demonstrate Event Handling.
14.	WAP to validate Email Address in JavaScript.
15.	Write a JavaScript for loop that will iterate from 0 to 15. For each iteration, it will check if the current number is odd or even, and display a message to the screen

Detailed Curriculum

SEM-IV

Course Structure:

Major 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDCT1251	Web Development Using J2EE	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)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDCT1251	Web Development Using J2EE	10	10	10	40	--	--	**50**

SSFDCT1251: Web Development Using J2EE (Major 1) Curriculum Details

Course pre-requisite:

1. Basic knowledge of programming
2. Basic knowledge of Core Java
3. Basic knowledge of HTML, CSS and JavaScript
4. Basic knowledge of SQL

Course Objectives:

1. To manage java objects using collection framework
2. To maintain database using JDBC
3. To create dynamic web pages using Servlet
4. To handle web form data
5. To create and design web page using JSP

Course Outcomes:

Students will be able to:

1. Design and build servlet web page
2. Build robust and maintainable web applications
3. Design web app for handling database
4. Do server side programming with java Servlets and JSP.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Collection Framework**	
	1.1	Collection interface	**7**
	1.2	ArrayList and Vector	
	1.3	Generics and Iterator	
	1.4	HashSet, TreeSet and Comparable	
	1.5	HashMap, HashTable and TreeMap	
2.0		**Java Database Connectivity**	
	2.1	JDBC Architecture and JDBC Drivers	**8**
	2.2	Establishing Connection, Executing Query and Processing Results	
	2.3	Prepared Statement	
	2.4	Callable Statement	
	2.5	Metadata	
3.0		**Servlets**	
	3.1	Introduction to Servlets & Deploying Servlet	**8**
	3.2	Servlet Life Cycle	
	3.3	Request and Response Object	
	3.4	Accessing Data from HTML Form	
	3.5	Using JDBC in Servlet	
	3.6	Servlet Chaining	
	3.7	Cookies and Sessions	
4.0		**JSP**	
	4.1	Introduction to JSP	**7**
	4.2	JSP Scripting Elements- Expression and Scriptlets	
	4.3	JSP Scripting Elements- Directives	
	4.4	Sessions in JSP	
	4.5	JavaBeans in JSP	
		Total	**30**

Reference Books:

1. Santosh Kumar K, “JDBC, Servlet, and JSP: Black Book”, Kogent Solutions Inc., 2008
2. Herbert Schildt, “Java The Complete Reference 9th Edition”, McGraw Hill Education (India) Private Limited, New Delhi.
3. Bruce W. Perry, “Java Servlet & JSP Cookbook”, O'Reilly Publication

Course Structure:

Major 2 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDCT1252	Data Structure and Algorithms	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)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDCT1252	Data Structure and Algorithms	10	10	10	40	--	--	**50**

SSFDCT1252: Data Structure and Algorithms (Major 2) Curriculum Details

Course pre-requisite:

1. Basic knowledge of computers
2. Basic knowledge of algorithms and problem solving.
3. Knowledge of C Programming Language

Course Objectives:

1. Implement Data Structures using C programming language
2. Develop problem-solving skills using Data Structures
3. Understand the fundamental concepts of Data Structures and their applications

Course Outcomes:

Students will be able to:

1. Learn the fundamentals of Algorithms.
2. Develop algorithm for problem-solving skills
3. Implement algorithm into a program.
4. How to work with algorithms and programs.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Introduction and Overview**	
	1.1	Definition	**5**
	1.2	Types of Data Structures	
	1.3	Data Structure operations	
	1.4	Space and time complexity	
	1.5	Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω, Theta θ)	
2.0		**Arrays and Linked List**	
	2.1	Linear array.	**10**
	2.2	Memory representation of linear array.	
	2.3	Array operations: Traversing, Inserting, Deleting, Searching.	
	2.4	Searching Methods: linear and binary.	
	2.5	Sorting Methods: Bubble Sort, Selection Sort, insertion sort, Quick Sort, Merge Sort.	
	2.6	Linked list and memory representation of linked list.	
	2.7	Types of linked list: singly, doubly, Circular and doubly linked list.	
3.0		**Stack and Queue**	
	3.1	Stack, Memory representation of stack.	**10**
	3.2	Stack operations (push and pop)	
	3.3	Arithmetic expression: Conversion of Infix Expression to Postfix Expression	
	3.4	Evaluation of postfix expression	
	3.5	Recursion: Factorial of Number.	
	3.6	Queue, Memory representation of Queue	
	3.7	Operations on Queue	
	3.8	Types of Queue: circular, priority, De-queue.	
4.0		**Tree and Graph**	
	4.1	Definition, Terminology, Binary tree.	**5**
	4.2	Traversal of binary tree.	
	4.3	Graph: definition, Terminology, Representation, Traversal	
		Total	**30**

Reference Books:

1. Seymour Lipschutz, “Data Structures with C”, Schaum’s Outlines, Tata McGraw-Hill, 2011.
2. Ashok Kamthane, “Introduction to Data Structures in C”, Pearson Education
3. Yashavant Kanetkar, "Data Structures Through C", 4th Edition, BPB Publications, 2022.

Course Structure:

Major 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDCP1253	Web Development Using J2EE (P)	--	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)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDCP1253	Web Development Using J2EE (P)	--	--	--	--	20	30	**50**

SSFDCP1253: Web Development Using J2EE (Major 1) Practical List

Practical No.	Title of Practical
1	Write a program to demonstrate ArrayList class for storing different type of objects.
2	Write a program to demonstrate Generics and Iterator for storing and accessing specific type of objects.
3	Write a program to demonstrate TreeSet class for storing Employee Data.
4	Write a program to demonstrate HashMap class for storing Customer Data.
5	Write a program to implement CURD operations using JDBC.
6	Write a program to demonstrate PreparedStatment interface.
7	Write a program to demonstrate CallableStatment interface.
8	Write a program to demonstrate DatabaseMetaData and ResultSetMetaData interface.
9	Write a program to create simple web page using Servlet.
10	Write a program to demonstrate Request and Response Object.
11	Write a program to handle HTML form data using Servlet.
12	Write a program to demonstrate servlet chaining.
13	Write a program to demonstrate using Session in Servlet.
14	Write a program to demonstrate JSP scripting elements.
15	Write a program to demonstrate JSP useBean.

Course Structure:

Major 2 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDCP1254	Data Structure and Algorithms (P)	--	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)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDCP1254	Data Structure and Algorithms (P)	--	--	--	--	20	30	**50**

SSFDCP1254: Data Structure and Algorithms (Major 2) Practical List

Practical No.	Title of Practical
1	Write a program for traversing linear array.
2	Write a program for insert operation of an array.
3	Write a program for delete operation of a array.
4	Write a program for search ITEM from a liner array by using linear search.
5	Write a program for search ITEM from a liner array by using binary search.
6	Write a program for sort the given array elements in ascending order by using bubble sort.
7	Write a program for sort the given array elements in ascending order by using selection sort.
8	Write a program for sort the given array elements in ascending order by using insertion sort.
9	Write a program to insert an element into a Singly Linked List.
10	Write a program to delete an element into a Singly Linked List.
11	Write a program to implement push operation on to a stack by using an array.
12	Write a program to implement pop operation on to a stack by using an array.
13	Write a program for evaluation of postfix expression.
14	Write a program to implement queue operation by using an array.
15	Write a program to implement binary tree.

Course Structure:

Minor 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDMT1251	Software Testing	02	--	02	--	02

Minor 1 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDMT1251	Software Testing	10	10	10	40	--	--	**50**

SSFDMT1251: Software Testing (Minor 1) Curriculum Details

Course pre-requisite:

1. Basic knowledge of computers.
2. Basic knowledge of SDLC.
3. Basic knowledge of programming languages like C/C++/Java .

Course Objectives:

1. To provide knowledge of latest testing tools.
2. To understand the development and testing plans.
3. To learn various testing tools for quick detection of bugs and errors.
4. To work with various software testing methods.
5. To provide skills to design test case plan for testing software

Course Outcomes:

Students will be able to:

1. Determine the correctness, completeness and quality of software being developed.
2. Understand the technical documentation of software.
3. To understand various software testing methods and strategies.
4. To understand latest testing tools used in the software industries.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Introduction and Approaches to Testing**	
	1.1	Introduction to Software testing and Testing Objectives	**5**
	1.2	Testing principles and Testing fundamentals	
	1.3	V Model	
	1.4	White Box Testing and it's types	
	1.5	Black Box Testing and it's types	
2.0		**Software Testing Strategies and STLC**	
	2.1	Software Testing Process	**10**
	2.2	Unit Testing and Integration Testing	
	2.3	System Testing and Acceptance Testing	
	2.4	Big Bang Approach and Sandwich approach	
	2.5	Performance, Regression, Smoke and Load Testing	
	2.6	Overview of the stages of STLC	
	2.7	Test Case Design	
	2.8	Test Cases for Entry and Exit Criteria	
3.0		**Agile testing and Defect Management**	
	3.1	Agile Testing and Agile principles and values	**8**
	3.2	Agile Testing Quadrants	
	3.3	Defect Life Cycle and Defect Classification	
	3.4	Defect Report and Defect management	
	3.5	Test scenario and Test case template	
	3.6	Design test case for given application and Design test cases in excel	
4.0		**Automation Testing**	
	4.1	Introduction Of Selenium	**7**
	4.2	Components Of Selenium	
	4.3	Selenium Webdriver	
	4.4	Selenium WebDriver Commands	
	4.5	Locators Of Selenium (Webdriver)	
	4.6	TestNG Framework	
		Total	**30**

Reference Books:

1. Software Engineering -A Practitioner's approach, Sixth Edition, Roger S. Pressman, McGraw-Hill Higher Education.
2. Software Testing Concepts and Tools, Nageswara Roo, Dreamtech Publication
3. Srinivasan Desikan and Gopalaswami Ramesh – Software Testing Principles and practices – Pearson Education India
4. Effective Methods of Software Testing – William E Perry, 3rd Edition, Wiley Publishing Inc
5. Managing the Testing Process: Practical Tools and Techniques for Managing Hardware and Software Testing, Rex Black, Microsoft Press

Web References:

1. http://www.selenium.dev
2. http://www.toolsqa.com
3. https://www.guru99.com/selenium-tutorial.html
4. https://www.tutorialspoint.com/selenium

Course Structure:

Minor 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDMP1251	Software Testing (P)	--	02	--	02	02

Minor 1 – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDMP1251	Software Testing (P)	--	--	--	--	20	30	**50**

SSFDMP1251: Software Testing (P) (Minor 1) Practical List

Practical No.	Title of Practical
1	Write test case for entry and exit criteria.
2	Write test plan for a given application.
3	Write test case in excel.
4	Write test cases for applying statement, decision, loop, branch coverage criteria.
5	Write test cases for applying ECP and BVA.
6	Find defect from a any given scenario.
7	Write a detailed defect report for a sample defect.
8	Design test cases for Simple Calculator Application.
9	Design test cases for application for Online Air Ticket Booking / Railway Reservation Form.
10	Design test cases for E-Commerce shopping portal's Login form (like Flipkart, Amazon).
11	Design test cases for Web pages of any website / College / University website
12	Define Test cases and Test Plan for simple applications like A. Mobile app like calculator B. Notepad desktop app
13	Prepare a defect report after executing Test cases for Withdraw Amount from ATM machine.
14	Prepare a defect report after executing Test cases for Login form.
15	Design and run Test cases using automated testing Tools for A. Text Editor like Word / WordPad

Course Structure:

Generic Electives-Teaching Scheme

Course Code	Course Name	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDGE1251	Data Analysis with Excel	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)	
SSFDGE1251	Data Analysis with Excel	10	10	10	40	--	--	**50**

SSFDGE1251: Data Analysis with Excel (Generic Electives) Curriculum Details

Course pre-requisite:

1. Basic knowledge of computers and Familiarity with Microsoft Excel.

Course Objectives:

- Understand and navigate Excel for organizing and managing data.
- Apply essential functions and formulas to clean and transform datasets.
- Create summaries and visualizations using PivotTables and charts.

Course Outcomes:

Students will be able to:

- Use Excel to organize, format, and manage raw datasets.
- Apply formulas and functions to clean and transform data.
- Generate PivotTables and charts to summarize and visualize data.
- Organize and format data efficiently using Excel tools.
- Apply Excel's analysis tools to solve real-world data problems.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Getting Started with Excel**	
	1.1	Introduction to Excel Interface and Workbook Structure	**8**
	1.2	Data Entry, Formatting, and Basic Spreadsheet Navigation	
	1.3	Working with Rows, Columns, and Sheets	
	1.4	Basic Formulas: SUM(), AVERAGE(), COUNT()	
	1.5	Sorting and Filtering Data	
2.0		**Essential Functions and Data Cleaning**	
	2.1	Logical Functions: IF(), AND(), OR()	**7**
	2.2	Text Functions: LEFT(), RIGHT(), UPPER(), TRIM()	
	2.3	Handling Errors: IFERROR() and ISBLANK()	
	2.4	Data Cleaning Techniques: Removing duplicates, text-to-columns, find & replace	
	2.5	Using Flash Fill and Data Validation	
3.0		**Data Summarization and Visualization**	
	3.1	Introduction to Charts: Bar, Line, Pie, and Combo Charts	**8**
	3.2	Creating and Customizing PivotTables	
	3.3	Using PivotCharts for Interactive Analysis	
	3.4	Conditional Formatting for Highlights and Trends	
	3.5	Sorting, Grouping, and Slicing Data	
4.0		**Introduction to Analysis Tools**	
	4.1	What-If Analysis: Goal Seek and Scenario Manager	**7**
	4.2	Introduction to Power Query	
	4.3	Importing and Transforming Data	
	4.4	Managing Large Data Sets	
		Total	**30**

Reference Books:

1. "Excel 2021 for Beginners" by Tech Demystified
2. "Data Analysis Using Microsoft Excel" by Michael R. Middleton
3. "Excel Basics to Blackbelt" by Elliot Bendoly
4. "Excel for Dummies" by Greg Harvey

Course Structure:

Vocational Course - Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFDVC1251	React JS	--	04	--	02	02

Vocational Course - Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFDVC1251	React JS	--	--	--	--	20	30	**50**

SSFDVC1251: React JS (Vocational Course) Practical List

Sr. No.	Title of Practical
1	Write a JavaScript program demonstrating variables, arrow functions, rest and spread operators.
2	Create a JavaScript example showing object and array destructuring, and use of template literals.
3	Implement a class in JavaScript with methods and demonstrate callbacks, promises, and async/await.
4	Create a simple React app and render a basic component using JSX.
5	Demonstrate passing and using props in functional React components.
6	Build a React component with state management using useState and show dynamic updates.
7	Create a React component using useEffect for side effects like fetching API data.
8	Implement useContext for global state sharing between components.
9	Demonstrate inline styling and CSS modules in a React component.
10	Build a custom hook for fetching data and using it across multiple components.
11	Design a React form with form elements and implement validation logic using states.
12	Create a dynamic menu using JSX and demonstrate menu generation without JSX.
13	Add webpack to a React project and configure Babel for ES6+ support.
14	Implement client-side routing in a React app using React Router.
15	Create a simple Redux store, dispatch actions, and display state updates in a component.

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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