॥ 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 Engineering (Single Major)

Second Year

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

UNDERGRADUATE PROGRAMME OF SCIENCE & TECHNOLOGY

Major in **SFE** and Minor in **DSM** (Software Engineering)

Under the Faculty of Science & Technology

(As per NEP-2020)

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: SFE (Major) / DSM (Minor 1)

B. Sc. Software Engineering (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	SSFECT1201 (2cr) SSFECT1202 (2cr) SSFECP1203 (2cr) SSFECP1204 (2cr) 8 Credits	SSFEMT1201 (T 2Cr) SSFEMP1201 (P 2 Cr) 4 Credits	---	SSFEGE1201 (2 Cr) 2 Credits	SSFESC1201 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	SSFECT1251 (2cr) SSFECT1252 (2cr) SSFECP1253 (2cr) SSFECP1254 (2cr) 8 Credits	SSFEMT1251 (T 2Cr) SSFEMP1251 (P 2 Cr) 4 Credits	---	SSFEGE1251 (2 Cr) 2 Credits	SSFEVC1251 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	

Exit option: UG Diploma in Major SFE and Minor DSM on completion of 44 credits and **additional 4 credits NSQF / Internship in SFE**

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. **SFE** –Software Engineering

B. Sc. Software Engineering 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	SSFECT1201	OOPS with JAVA	02	--	**04**	03	--
	SSFECT1202	Computer Network	02	--		03	--
	SSFECP1203	OOPS with JAVA (P)	--	02	**04**	--	04
	SSFECP1204	Computer Network (P)	--	02		--	04
Optional 2	SSFEMT1201	PHP and MySQL	02	--	**04**	03	--
	SSFEMP1201	PHP and MySQL (P)	--	2		--	04
Generic Electives *(from other Faculty)*	SSFEGE1201	Multimedia	02	--	**02**	03	--
Skill Based Course (related to Major)	SSFESC1201	JavaScript (P)	--	02	**02**	--	04
Ability Enhancement Course	AECENG1201	**(Basket 4)**	02	--	**04**	02	--
	AECMIL1201	**(Basket 4)**	02	--		02	--
Co-curricular Courses (CCC)	CCCXXX1201	**(Basket 6)**	--	02	**02**	--	02
Field Work / Project	--	--	--	--		--	--
Total Credits			**12**	**10**	**22**	**16**	**18**

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

Examination Scheme

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

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

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA			
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)	CA (8)	ESA (9)	
Optional 1	SSFECT1201	OOPS with JAVA	10	10	10	40	--	--	50
	SSFECT1202	Computer Network	10	10	10	40	--	--	50
	SSFECP1203	OOPS with JAVA(P)	--	--	--	--	20	30	50
	SSFECP1204	Computer Network(P)	--	--	--	--	20	30	50
Optional 2	SSFEMT1201	PHP and MySQL	10	10	10	40	--	--	50
	SSFEMP1201	PHP and MySQL(P)	--	--	--	--	20	30	50
Generic Elective	SSFEGE1201	Multimedia	10	10	10	40	--	--	50
Skill Based Course	SSFESC1201	JavaScript (P)	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1201	**(Basket 4)**	10	10	10	40	--	--	50
	AECMIL1201	**(Basket 4)**	10	10	10	40	--	--	50
Co-curricular Courses (CCC)	CCCXXX1201	**(Basket 6)**	--	--	--	--	20	30	50
Field Work / Project	SSFEFP1201	--	--	--	--	--	--	--	--

B. Sc. Software Engineering 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	SSFECT1251	Programming in C#	02	--	**04**	03	--
	SSFECT1252	Operating System	02	--		03	--
	SSFECP1253	Programming in C# (P)	--	02	**04**	--	04
	SSFECP1254	Operating System (P)	--	02		--	04
Optional 2	SSFEMT1251	Software Engineering	02	--	**04**	03	--
	SSFEMP1251	Software Engineering(P)	--	02		--	04
Generic Electives *(from other Faculty)*	SSFEGE1251	Cyber Security	02	--	**02**	--	04
Vocational Course (related to Major)	SSFEVC1251	NoSQL (P)	--	02	**02**	03	--
Ability Enhancement Course	AECENG1251	**(Basket 4)**	02	--	**06**	02	--
	AECMIL1251	**(Basket 4)**	02	--		02	--
Value Education Courses	VECEVS1251	**(Basket 5)**	02	--		03	--
Co-curricular Courses	--	--	-	--	**-**	--	--
Total Credits			**14**	**08**	**22**	**19**	**16**

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

Examination Scheme

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

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

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA			
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)	CA (8)	ESA (9)	
Optional 1	SSFECT1251	Programming in C#	10	10	10	40	--	--	50
	SSFECT1252	Operating System	10	10	10	40	--	--	50
	SSFECP1253	Programming in C# (P)	--	--	--	--	20	30	50
	SSFECP1254	Operating System (P)	--	--	--	--	20	30	50
Optional 2	SSFEMT1251	Software Engineering	10	10	10	40	--	--	50
	SSFEMP1251	Software Engineering(P)	--	--	--	--	20	30	50
Generic Elective	SSFEGE1251	Cyber Security	10	10	10	40	--	--	50
Vocational Course	SSFEVC1251	NoSQL (P)	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1251	**(Basket4)**	10	10	10	40	--	--	50
	AECMIL1251	**(Basket4)**	10	10	10	40	--	--	50
Value Education Courses	VECEVS1251	**(Basket 5)**	10	10	10	40	--	--	50
Co-curricular Courses	CCCXXX1251	-	--	--	--	--	--	--	--

Detailed Curriculum

B.Sc. Software Engineering Second Year UG programme under the Faculty of Sci. & Tech of S.R.T.M.U., Nanded

Course Structure:

Major 1 -Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFECT1201	OOPS with JAVA	03	--	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)	
SSFECT1201	OOPS with JAVA	10	10	10	40	--	--	**50**

SSFECT1201: OOPS with JAVA *(Major 1) Curriculum Details*

Course pre-requisite:

1. Basic knowledge of computers

Course Objectives:

- Illustrating flowcharts and designing algorithms
- Exercising OOP's to solve real time problems
- Students can learn to develop Java programs, including how to control program sequence, implement strings, and store different data types

Course Outcomes:

Students will be able to:

- Learn the fundamentals of Java programming
- Develop problem-solving skills
- Gain experience with Object oriented programming
- How to work with condition and looping statement
- How to work with arrays

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Basic Concepts of Object Oriented Programming (OOP)**	**5**
	1.1	Basic Concepts of Object Oriented Programming (OOP),	
	1.2	Benefits and Applications of OOP.	
	1.3	Java Evolution: Java Features,	
	1.4	Java Environment.	
	1.5	Overview of Java Language: Introduction to Simple Java Program,	
	1.6	Use of Comments and Math function,	
	1.7	Application of two classes,	
	1.8	Java Program Structure,	
	1.9	Java Tokens and statements,	
	1.11	Implementing Java program and JVM,	
	1.12	Command Line Arguments.	
2.0		**Constants, Variables and Data Types**	**10**
	2.1	Constants, Variables,	
	2.2	Data Types,	
	2.3	Declaration of Variables,	
	2.4	Giving values to Variables,	
	2.5	Typecasting.	
	2.6	Operators & Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment & Decrement operators, conditional operators, Bitwise operators,	
		Arithmetic Expressions, Evaluation of Expressions, Type Conversions in Expressions,	
		Operator Precedence & Associativity.	
	2.7	Decision Making, Branching & Looping: Decision Making with Control Statements, looping statements,	

	2.8	Jump in loops, Labelled loops.	
3.0		**Classes, Objects and Methods**	**10**
	3.1	Defining Class, Methods Declaration	
	3.2	Constructors	
	3.3	Methods Overloading, Overriding Methods,	
	3.4	Arrays, Strings and Vectors: 1D arrays, Creating an Array, 2D arrays, Strings, Vectors, Wrapper Classes, Enumerated Types	
	3.5	Inheritance: Defining, extending classes, and Implementing Interfaces. Multiple inheritance and polymorphism.	
4.0		**Packages**	**5**
	4.1	Basics of packages, System packages, Creating and accessing packages, creating user defined packages, Adding class to a package.	
	4.2	Exception Handling: Using the main keywords of exception handling: try, catch, throw, throws and finally; Nested try, Multiple catch statements.	
	4.3	Creating user defined exceptions.	
		Total	**30**

Reference Books:

1. Balaguruswamy E. (2023). Programming with JAVA: A Primer. 7th edition. India: McGraw Hill Education
2. Schildt, H. (2022). Java: The Complete Reference. 12th edition. McGraw-Hill Education.
3. Arunesh Goyal, The Essentials of JAVA, Khanna Book Publishing Company Private Limited, 2012.
4. Tanweer Alam, Core JAVA, Khanna Book Publishing Company Private Limited, 2015.
5. Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson, 2008.
6. S. Malhotra and S. Choudhary, Programming in Java, 2nd Edition, Oxford University Press, 2014.

Course Structure:

Major 1 -Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFECP1203	OOPS with JAVA (Practical)	--	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)	
SSFECP1203	OOPS with JAVA (Practical)	--	--	--	--	30	20	**50**

SSFECP1203: OOPS with JAVA *(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 program to send the name and surname of a student through command line arguments and print a welcome message for the student.
4	Write a java program to find the largest number out of n natural numbers.
5	Write a java program to find the Fibonacci series & Factorial of a number using recursive and non-recursive functions.
6	Write a java program to multiply two given matrices.
7	Write a Java program for sorting a given list of names in ascending order.
8	Write a Java program that checks whether a given string is a palindrome or not . Ex:MADAM is a palindrome.

9	Write a java program to read n number of values in an array and display it in reverse.
10	Create a JAVA class called Student with the following details as variables within it. a. USN, NAME, BRANCH, PHONE, PERCENTAGE order. b. Write a JAVA program to create n Student objects and print the USN,Name, Branch, Phone, and percentage of these objects with suitable headings.
11	Write a Java program that displays the number of characters, lines and words in a text.
12	Write a Java program to create a class called Shape with methods called getPerimeter() and getArea(). Create a
13	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.
14	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'.
15	Write a Java package program for the class book and then import the data from the package and display the result.

Course Structure:

Major 2 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFECT1202	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)	
SSFECT1202	Computer Network	10	10	10	40	--	--	**50**

SSFECT1202: 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 sub netting, 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 sub netting, 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, Packet Switching, Message Switching	
4.0		**Networking Devices and Advanced Networking**	
	4.1	Network Devices - NIC Cards, Switch, Repeaters,	**6**

		Bridges, Gateways, Router.	
	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	

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 2 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFECP1204	Computer Network (Practical)	--	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)	
SSFECP1204	Computer Network (Practical)	--	--	--	--	20	30	**50**

SSFECP1204: 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 sub netting 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
SSFEMT1201	PHP and MySQL	03	--	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)	
SSFEMT1201	PHP and MySQL	10	10	10	40	--	--	**50**

SSFEMT1201: PHP and MySQL *(Minor 1) Curriculum Details*

Course pre-requisite:

1. Basic knowledge about Web Technology like html, css and Javascript.
2. Basic knowledge about Object Oriented Programming like C++.
3. Introductory knowledge about RDBMS like SQL.

Course Objectives:

1. The Core-PHP, Server Side Scripting Language.
2. Design a dynamic and interactive Web page.
3. The PHP-Database handling.

Course Outcomes:

Students will be able to:

1. Design dynamic and interactive web pages and websites.
2. Run PHP scripts on server and retrieve results.
3. Handle databases like MySQL using PHP in websites.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Introduction to PHP**	
	1.1	Introduction to PHP language	**7**
	1.2	Introduction to XAMPP	
	1.3	Basic syntax of PHP and Sending Data to the Web Browser.	
	1.4	Writing Comments in PHP	
	1.5	Implementation of White Space and magic Quote in PHP.	
	1.6	Using Variable in PHP	
	1.7	Using Constant in PHP	
2.0		**Programming with PHP**	
	2.1	Data types in PHP	**7**
	2.2	Operators in PHP	
	2.3	Sending Data to PHP using HTML Form	
	2.4	Conditional statements in PHP	
	2.5	Looping statements in PHP	
	2.6	Types of Arrays	
	2.7	Element Looping with indexed and associative array	
3.0		**Using Functions**	
	3.1	Defining and calling a custom functions in PHP	**8**
	3.2	Date and time using Date Function	
	3.3	Formatting with String functions	
	3.4	Searching substring & Replacing from string	
	3.5	Including Multiple Files with Include() and Require()	
	3.6	Handling HTML Forms with PHP Redux	
	3.7	Using Sessions and Cookies	

4.0		**Database Connectivity with MySql**	
	4.1	Creating database and table structure in MySQL using phpMyAdmin	**8**
	4.2	Connection with MySql Database	
	4.3	Inserting records in to MySQL table.	
	4.4	Updating records in to MySQL table.	
	4.5	Deleting records in to MySQL table.	
	4.6	Selecting records from MySQL table and displaying it in HTML.	
		Total	**30**

Reference Books:

1. "Learning PHP, MySQL & JavaScript", 7th Edition Author by Robin Nixon, Publisher(s): O'Reilly Media, Inc. ISBN: 9781098152352
2. "PHP and MYSQL Web Development", 5th Edition Author by Luke Welling and Laura Thomson, Publisher(s):Pearson Education, ISBN-13978-9332582736
3. "PHP: The Complete Reference", 5th Edition Author by by Steven Holzner, Publisher(s):McGraw Hill Education, ISBN-13978-0070223622

Course Structure:

Minor 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFEMP1201	PHP and MySQL (Practical)	--	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)	
SSFEMP1201	PHP and MySQL (Practical)	--	--	--	--	20	30	**50**

SSFEMP1201: PHP and MySQL *(Minor 1) Practical List*

Practical No.	Title of Practical
1	Creating HTML FORM (User Registration Form)
2	Write php code to sending input from HTML to PHP.
3	Write PHP Code to demonstrate variables.
4	Write php code to implementation of Operators.
5	Write php code to demonstrate Indexed Array.
6	Write php code to demonstrate Associated Array in PHP.
7	Write php code to demonstrate String Manipulation Functions
8	Write php code to include multiple files with include() and required() function
9	Write php code to demonstrate concept of Forms with PHP Redux
10	Write php code to demonstrate different date format.
11	Write php code to Creating and Calling Your Own Functions
12	Write php code to demonstrate Session and Cookies
13	Write a program to Connecting to MySQL Database and insert records in to table.
14	Write php code to Update and Delete records from MySQL Table
15	Write php code to Select all records from MySQL table and displaying in to HTML table.

Course Structure:

Generic Elective – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFEGE1201	Multimedia	03	--	02	--	02

Generic Elective – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFEGE1201	Multimedia	10	10	10	40	--	--	**50**

SSFEGE1201: Multimedia ***(Generic Elective) Curriculum Details***

Course pre-requisite:

1. Students should have basic knowledge about computer handling.

2. This course focuses on the composition and structure of multimedia, as well as the numerous technologies used in its creation and development.

Course Objectives:

1. Multimedia is content that uses a combination of different content forms such as text, audio, images, animations, video and interactive content.

2. Multimedia contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand produced material.

3. The overall objective of these courses is to develop multimedia professionals equipped with knowledge, skills and practical

Course Outcomes:

Students will be able to:

1. Student will learn the different content forms of Multimedia such as text, audio, images, animations, video and interactive content.

2. Recall the fundamental concepts of computers with the present level of knowledge of the students.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Introduction to Multimedia**	
	1.1	Multimedia elements	**5**
	1.2	Multimedia Applications	
	1.3	Global structure of Multimedia	
	1.4	Data Compression	
	1.5	Basic compression techniques (Run length & Huffman encoding)	
	1.6	Introduction to compression techniques: JPEG, MPEG	
2.0		**Optical Storage Media & Audio File Formats**	
	2.1	Optical Storage Media & Retrieval Technologies	**10**
	2.2	Basic Technology	
	2.3	Video Disk & other WORMS	
	2.4	CD-ROM and Multimedia Highway	
	2.5	DVD- ROM	
	2.6	Basic Concept of Sound	
	2.7	MIDI	
	2.8	Digital audio	
	2.9	Audio file formats	
3.0		**Image and Graphics**	
	3.1	Making Still Images: BITMAPS, Vector Drawing	**5**
	3.2	Image Formats	
	3.3	Graphics Format	
	3.4	Image file format: BMP, JPEG, TIFF, PNG	
4.0		**Video & Animation**	
	4.1	Basic concepts of Video	**5**

	4.2	Broadcast Video Standards	
	4.3	Television: Conventional systems, Enhanced definition systems, High Definition system	
	4.4	Concept of Computer based Animation	

Reference Books:

1. Multimedia System Design By P. K. Andleigh, Kiran Thakkar, Dhanpat Rai Publications
2. Multimedia: Computing Communications & Applications, By Ralf Steinmetz And Klara Nehrstedt, Pearson Education.

Course Structure:

Skill Based -Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFESC1201	JavaScript (P)	--	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)	
SSFESC1201	JavaScript (P)	--	--	--	--	20	30	**50**

SSFESC1201: JavaScript (P) ***(Skill Based) Curriculum Details***

Course pre-requisite:

1.Basic knowledge of html5

Course Objectives:

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

Course Outcomes:

Students will be able to:

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

Curriculum Details:

Sr. No.	Practical List
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.

Course Structure:

Major 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFECT1251	Programming in C#	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)	
SSFECT1251	Programming in C#	10	10	10	40	--	--	**50**

SSFECT1251: Programming in C# ***(Major 1) Curriculum Details***

Course pre-requisite:

1. Basic knowledge of object-oriented programming (OOP's).

Course Objectives:

1. To learn and understand basic concepts of Windows Programming.
2. To understand and work on desktop, Console and MVC application.
3. To learn Design pattern of MVC.

Course Outcomes:

Students will be able to:

1. Understand the .NET core concept and Design pattern of MVC.
2. Gain experience working on desktop, Console and Web Based Application.
3. To develop database connectivity application.

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Introduction to .NET Framework**	
	1.1	Introduction to .NET Framework and its components	**10**
	1.2	Overview of Visual Studio IDE	
	1.3	Common Language Runtime(CLR)	
	1.4	C# Introduction	
	1.5	C# Syntax	
	1.6	Variables and Datatypes	
	1.7	Operators in C#	
2.0		**Working with Console Application and OOPs**	
	2.1	Control flow statements	**10**
	2.2	Looping Statements	
	2.3	Functions in C#	
	2.4	.NET Collections a) Array b) ArrayList	
	2.5	Creating class,methods and object	
	2.6	Using Namespace (DLL)	
	2.7	creating and using interfaces,	
	2.8	Exception Handling	
3.0		**Windows Applications and Windows Controls**	
	3.1	Windows Applications and Windows Controls	**5**
	3.2	Creating and Customizing Windows Form	
	3.3	TextBox and Label Control	
	3.4	Button, CheckBox and RadioButton	
	3.5	ListBox and ComboBox control	
	3.6	Developing a Simple ADO.NET Based Application	
	3.7	Performing crud operations ado.net c#	

4.0		Introduction to .NET Core and MVC	
	4.1	Introduction to .NET Core	**5**
	4.2	MVC Architecture	
	4.3	Creating Controllers and Actions	
	4.4	Parameters in Action methods	
	4.5	Creating View	
	4.6	Introduction to Models	
	4.7	Creating models using 'CodeFirst approach'	

Reference Books:

1. Programming in C# E Balagurusamy Mc Graw Hill

2. Visual C#.Net C Muthu Mc Graw Hill

3. Learning ASP.NET Core MVC Programming 1st Edition, Kindle Edition

   by Mugilan T. S. Ragupathi)

4. Pro ASP.NET Core MVC Develop cloud-ready web applications using Microsoft's latest framework, ASP.NET Core MVC Sixth Edition Adam Freeman

Course Structure:

Major 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFECP1253	Programming in C# (Practical)	--	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)	
SSFECP1253	Programming in C# (Practical)	--	--	--	--	20	30	**50**

SSFECP1253: Programming in C# (Major 1) Practical List

Practical No.	Title of Practical
1	Write program in c# to display “Welcome to C#”
2	Create console Application to demonstrate if else statement
3	Create Console Application to demonstrate looping statements.
4	Create Console Application to perform creating user define function.
5	Create Console Application to demonstrate ArrayList class in C#
6	Creating class, methods and object in c#
7	Creating and Using Namespace (DLL) in c#
8	creating and using interfaces
9	Write code to demonstrate Exception Handling in C#
10	Create Windows Applications to customizing form properties.
11	Create Windows Applications demonstrate adding control to form and setting properties of control.
12	Create windows application to Performing crud operations ado.net c#
13	Creating Controller and Actions methods in MVC

14	Creating ActionResult and ViewResult, Returning a view in MVC
15	Creating models using ‘CodeFirst approach’ in MVC

Course Structure:

Major 2 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFECT1252	Operating System	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)	
SSFECT1252	Operating System	10	10	10	40	--	--	**50**

SSFECT1252: Operating System ***(Major 2) Curriculum Details***

Course pre-requisite:

1. Essential for understanding computer architecture, how hardware and software interact.
2. OS concepts are often implemented in low-level code
3. Crucial for grasping OS internals like scheduling, memory management, and file systems

Course Objectives:

1. Understand the fundamental concepts of Operating System.
2. Understanding Resource Management, Learning Process, Memory Control and Gaining System-Level Insight
3. Implement the scheduling algorithms using C programming language

Course Outcomes:

Students will be able to:

1. Explain the fundamentals of the operating system
2. CPU scheduling, process management, memory, deadlocks, and storage management.
3. Compare the performance of CPU scheduling algorithms

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Operating System Overview**	
	1.1	Definition, Components of OS, Types of Operating Systems	**5**
	1.2	Operating systems generations	
	1.3	An Operating system Resource manager	
	1.4	Operating system– Hierarchical And Extended machine view	
	1.5	Operating-System Services	
2.0		**Memory Management**	
	2.1	Define Memory, Types of Memory	**10**
	2.2	Single contiguous allocation technique	
	2.3	Multiprogramming concept	
	2.4	Internal and External fragmentation	
	2.5	Memory allocation strategies First fit, Best fit, and worse-fit	
	2.6	Partitioned, Paging, Segmentation. Demand paging techniques.	
3.0		**Process Management**	
	3.1	Process Definition, Process states	**8**
	3.2	Process Control Block	
	3.3	Scheduling Criteria	
	3.4	Process Scheduling: Definition, Scheduling objectives	
	3.5	Scheduling algorithms(FCFS, SJF, Priority Scheduling, Round-Robin Scheduling)	
4.0		**Deadlocks, Device Management and file system**	
	4.1	Deadlock characterization	**7**
	4.2	Deadlock prevention, avoidance	
	4.3	Banker's algorithm	
	4.4	Deadlock detection and recovery from deadlocks	
	4.5	Techniques for device management, Channels and Control Units	
	4.6	A simple file system, General Model of File System	

Reference Books:

4. Ekta Walia, Operating Systems Concepts, Khanna Publishing House, 2022 (AICTE Recommended Textbook)
5. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition OR Later edition, Wiley India Private Limited, New Delhi
6. Stallings (2006), Operating Systems, Internals and Design Principles, 5th edition, Pearson Education, India
7. Dr.S.B.Kishor , Operating System, Dsganu Prakashan , Nagpur
8. Andrew S Tanenbaum, Modern Operating Systems, Third Edition, Prentice Hall India.
9. Sumitabha Das, UNIX Concepts and Applications, 4th Edition, Tata McGraw-Hill

Course Structure:

Major 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFECP1254	Operating System (Practical)	--	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)	
SSFECP1254	Operating System (Practical)	--	--	--	--	20	30	**50**

SSFECP1254: Operating System **(Major 2) Practical List**

Practical No.	Title of Practical
1	**Windows Operating System Practical's:**
	a. Install/uninstall programs, manage files/folders, use File Explorer, format USBs, take screenshots.
	b. Change desktop themes, adjust resolution, set date/time, customize Start menu, manage user accounts.
	c. Run antivirus, set up firewall, use System Restore, Task Manager, check for Windows updates.
	d. Connect to Wi-Fi, manage IP/DNS, share files, use Remote Desktop, troubleshoot connectivity.
2	**Linux Operating System Practical's:**
	a. Create, move, copy, rename, and delete files/folders using terminal commands.
	b. Navigate directories (cd, ls, pwd), use wildcards/filters (find, locate, grep).
	c. View/edit file contents (cat, less, nano, vim, gedit), check system info.
	d. View disk usage (df -h, du -sh, lsblk), monitor system (top, htop, vmstat).
	e. List hardware (lscpu, lspci, lsusb), manage users and permissions (adduser, chmod, sudo).
3	**Study of CPU Scheduling Algorithms – FCFS and Round Robin:**

	Simulate First Come First Serve and Round Robin scheduling with process burst times.
4	**Study of Shortest Job First (SJF) CPU Scheduling Algorithm:**
	Demonstrate SJF scheduling with and without preemption, calculate waiting/turnaround time.
5	**Study of Priority CPU Scheduling Algorithm:**
	Demonstrate priority-based scheduling, handle processes with equal/different priorities.
6	**Demonstrate Paging Memory Management Technique:**
	Demonstrate page table creation, logical to physical address translation.
7	**Study of Segmentation Memory Management Technique:**
	Demonstrate segment table, and perform logical to physical address mapping.
8	**Study of First Fit, Best Fit, and Worst Fit Allocation:**
	Demonstrate contiguous memory allocation techniques and compare fragmentation.
9	**Study of FIFO Page Replacement Algorithm:**
	Demonstrate FIFO for page replacement and calculate page faults.
10	**Study of Sequential File Allocation Method:**
	Demonstrate sequential file allocation and calculate file space usage.
11	**Demonstrate LRU Page Replacement Algorithm:**
	Implement Least Recently Used page replacement and analyze performance.
12	**Demonstrate Optimal Page Replacement Algorithm:**
	Calculate and compare number of page faults using optimal strategy.
13	**Demonstrate Linked File Allocation Method:**
	Implement linked file allocation and simulate reading file blocks.
14	**Demonstrate Indexed File Allocation Method:**
	Create index blocks and simulate file access in indexed allocation.
15	**Demonstrate Disk Scheduling Algorithms (FCFS, SSTF, SCAN):**
	Compare disk access sequences and calculate total head movements.

Course Structure:

Minor 1 – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFEMT1251	Software Engineering	03	--	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)	
SSFEMT1251	Software Engineering	10	10	10	40	--	--	**50**

SSFEMT1251: Software Engineering ***(Minor 1) Curriculum Details***

Course pre-requisite:

1. Basic knowledge of Programming Language
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:

1. Describe the role and nature of software
2. Analyse and document software requirements
3. Apply software design principles and use UML diagrams for modeling software systems.
4. Demonstrate various software testing strategies
5. Implement software quality assurance techniques

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**Software Process and Agile Development**	
	1.1	Understand the evolving role and changing nature of software in modern computing systems.	**8**
	1.2	Explain layered software technology and a generic software process framework.	
	1.3	Describe and compare software process models including the Waterfall, Incremental, Evolutionary, and Unified Process models.	
	1.4	Explore the principles and practices of Agile software development, including Agile methods and the contrast between plan-driven and agile development.	
	1.5	Apply Agile practices such as Extreme Programming (XP), Scrum, and recognize toolsets used in Agile processes.	
2.0		**Software Requirements and Project Planning**	
	2.1	**Introduction to Software Requirements Engineering**: Functional and non-functional requirements, Software Requirements Specification (SRS), and requirements documentation.	**10**
	2.2	**Requirements Engineering Process**: Activities involved in requirements specification, elicitation, analysis, validation, and management.	
	2.3	**Risk Management in Software Projects**: Proactive vs. reactive strategies, identification and analysis of software risks, risk projection and refinement, and the RMMM (Risk Mitigation, Monitoring, and Management) plan.	
	2.4	**Software Project Planning Fundamentals**: Principles of software pricing, plan-driven development approach, and basics of project scheduling.	
	2.5	**Agile Planning and Estimation Techniques**: Agile planning methods and techniques for effort and cost estimation in software projects.	
3.0		**Software Design, Testing Strategies, and Product Metrics**	

	3.1	**Software Design Process and Quality** • Overview of the design process, design quality, and key design concepts. • Introduction to the design model and principles of software architecture.	**6**
	3.2	**Data and Architectural Design** • Data design and architectural design approaches. • Emphasis on modularity, separation of concerns, and scalable architecture.	
	3.3	**UML and Structural Modeling Techniques** • Basic structural modeling using UML diagrams: Class, Sequence, Collaboration, Use Case, and Component Diagrams.	
	3.4	**Software Testing Strategies** • Strategic approach to software testing. • Conventional, black-box, and white-box testing. • Validation testing, system testing, and debugging techniques.	
	3.5	**Software Product Metrics** • Understanding software quality and reliability. • Metrics for analysis, design, source code, testing, and maintenance.	
4.0		**Quality Management, Release Management, and Product Sustenance**	
	4.1	**Introduction to Software Quality** – Overview of quality concepts and the importance of software quality in modern development.	**6**
	4.2	**Software Quality Assurance (SQA)** – Processes and practices, including formal technical reviews and statistical quality control.	
	4.3	**Software Reliability and Reviews** – Understanding reliability, software reviews, and techniques for ensuring dependable software.	

	4.4	**Release Management Practices** – Planning for software releases, build strategies, risk assessment, and post-deployment monitoring.	
	4.5	**Product Sustenance and Maintenance** – Software maintenance, handling updates, managing end-of-life, and strategies for migration.	

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
SSFEMP1251	Software Engineering (Practical)	--	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)	
SSFEMP1251	Software Engineering (Practical)	--	--	--	--	20	30	**50**

SSFEMP1251: Software Engineering ***(Minor 1) Practical List***

Practical No.	Title of Practical
1	Create a Simple Software Development Life Cycle (SDLC) Model.
2	Agile Methodology Simulation.
3	Design a Software Process Framework.
4	Comparing Waterfall and Agile Models.
5	Case Study on Extreme Programming (XP).
6	Requirement Elicitation from Stakeholders.
7	Create a Software Requirements Specification (SRS).
8	Risk Identification and Mitigation Plan.
9	Software Project Estimation Exercise.
10	Agile Planning and Scheduling.
11	Design Class and Sequence Diagrams.
12	Black-box and White-box Testing for a Simple Application.
13	System Testing and Debugging.
14	Metrics Collection for Source Code.
15	Software Reliability Testing.

Course Structure:

Generic Elective – Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFEGE1251	Cyber Security	03	--	02	--	02

Generic Elective – Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [col (5+6) Or Col(7+8)]
		CA			ESA (6)			
		Test I (3)	Test II (4)	Avg. (T1&t2) (5)		CA (7)	ESA (8)	
SSFEGE1251	Cyber Security	10	10	10	40	--	--	**50**

SSFEGE1251: Cyber Security ***(Generic Elective) Curriculum Details***

Course pre-requisite:

1. Basic Computer Skills like how to use operating systems (Windows/Linux/macOS), install software, and navigate file systems.
2. Familiarity with Networking Concepts like IP addresses, DNS, firewalls, and ports.
3. Interest in Technology & Problem Solving

Course Objectives:

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

Course Outcomes:

Students will be able to:

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

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required
1.0		**IT Act and Encryption**	
	1.1	Object and Scope of the Act	**5**
	1.2	Symmetric Cryptography	
	1.3	Asymmetric Cryptography	
	1.4	RSA Algorithm	
	1.5	Public Key Encryption	
2.0		**Authentication of Electronic records & E-Governance**	
	2.1	Authentication of Electronic records	**10**
	2.2	Digital Signature	
	2.3	RSA Digital Signature	
	2.4	Hash Function	
	2.5	Working of Digital Signature	
3.0		**Certifying Authorities**	
	3.1	Need of Certifying Authorities	**5**
	3.2	Functioning of Certifying Authorities	
	3.3	Types of Certificates ,	
	3.4	Identification, Authorizing, Transactional certificate	
	3.5	Appointment and Functions of Controller	
4.0		**Domain Name Disputes and Cyber Crimes**	
	4.1	Background of Domain	**10**
	4.2	Insertion of Internet Domain Names and the trademark Law	
	4.3	Classification of Cyber Crime	
	4.4	Damage to computer System: Unauthorized Access, Packet Sniffing, Tempest attack, Password Cracking, Butter overflow	
	4.5	Computer virus: Viruses, Logic Bomb, Worms	

Reference Books:

1. Cyber Law in India by Farooq Ahmad – Pioneer Books
2. Hand book of Cyber & E-commerce Laws by P.M. Bakshi & R.K.Suri – Bharat Law house New Delhi
3. The Indian Cyber Law by Suresh T Vishwanathan – Bharat Law house New Delhi.

Course Structure:

Vocational Course -Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme(Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SSFEVC1251	NoSQL(P)	--	02	--	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)	
SSFEVC1251	NoSQL(P)	--	--	--	--	20	30	**50**

SSFEVC1251**:** NoSQL *(Vocational Course) Practical List*

Practical No.	Title of Practical
1	**Introduction to NoSQL:** Definition, characteristics, and types of NoSQL databases and commands.
2	**Study of Data Types in MongoDB:** Explore various built-in data types used in MongoDB collections.
3	**Creating and Manipulating Data in MongoDB:** Create collections, insert, retrieve, and update documents.
4	**Study of Altering Collections in MongoDB:** Modify structure and schema of documents using update and alter operations.
5	**Study of Data Constraints in MongoDB:** Implement validation rules, unique fields, and data integrity constraints.
6	**Study of Operators in MongoDB:** Use comparison, logical, and arithmetic operators in queries and updates.
7	**Study of NoSQL Functions:** Explore built-in MongoDB functions for aggregation and manipulation.
8	**Study of Views in MongoDB:** Create and query views for abstraction and simplified access to data.
9	**Study of Joining Collections in MongoDB:** Use `$lookup` for performing join operations between collections.
10	**Study of Subqueries in MongoDB:** Implement nested queries using aggregation framework and expressions.

11	**Study of PL/SQL-like Blocks in MongoDB:** Explore script-based operations using JavaScript in MongoDB shell.
12	**Study of Triggers in MongoDB (Change Streams):** Implement real-time data change monitoring with Change Streams.
13	**Study of Cursors in MongoDB:** Understand how MongoDB cursors work for handling large datasets.
14	**Implement Indexing in MongoDB:** Create and use indexes to optimize search and query performance.
15	**Backup and Restore Operations in MongoDB:** Perform data export, import, backup, and restore using MongoDB tools.

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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