॥ 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 च्या अनुषंगाने शैक्षणिक वर्ष २०२३–२४ पासून संलग्न महाविद्यालये व विद्यापीठ संकुलांत पदव्युत्तर पदवी प्रथम वर्ष आणि विद्यापीठ संकुले व न्यू मॉडेल डिग्री कॉलेज मध्ये पदवी प्रथमवर्ष अभ्यासक्रम लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, शासन निर्णय क्र. एनईपी २०२०/प. क्र. ०९/विशि–३/शिकाना, दिनांक २० एप्रिल २०२३ व शासन पत्र. क्र एनईपी २०२०/प. क्र. ०९/विशि–३, दिनांक १६ जून २०२३ अन्वये सूचित केल्यानुसार राष्ट्रीय शैक्षणिक धोरण २०२०च्या अनुषंगाने दिलेल्या आराखडया नुसार दिनांक १६ जून २०२३ रोजी संपन्न झालेल्या मा. विद्यापरिषदेच्या बैठकीत ऐनवेळचा विषय क्र. ०५/५६–२०२३ अन्वये मान्यता दिल्यानुसार प्रस्तुत विद्यापीठाच्या विज्ञान व तंत्रज्ञान विद्याशाखा अंतर्गत खालील पदव्युत्तर पदवी अभ्यासक्रम (AICTE, PCL, BCI, CoA, NCTE इ. सारख्या नियमक संस्थाची मान्यता आवश्यक असलेले अभ्यासक्रम वगळून) संलग्न महाविद्यालये, विद्यापीठ परिसर व उपपरिसर संकुलांमध्ये आणि पदवी प्रथम वर्ष अभ्यासक्रम विद्यापीठ परिसर व उपपरिसर संकुले व विद्यापीठ संचलित न्यू मॉडेल डिग्री कॉलेज, हिंगोली येथे शैक्षणिक वर्ष २०२३–२४ पासून लागू करण्यात येत आहे.

1) M.Sc. Biotechnology (1st Year) - Campus School
2) M.Sc. Biotechnology (1st Year) – Affiliated colleges
3) B.Sc. Biotechnology (1st Year) – New Model Degree College, Hingoli
4) M.Sc. Botany (1st Year) - Campus School
5) M.Sc. Botany (1st Year) – Affiliated colleges
6) M.Sc. Herbal Medicine (1st Year) - Affiliated colleges
7) M.Sc. Chemistry (1st Year) - Campus School
8) M.Sc. Chemistry (1st Year) - Affiliated colleges
9) M.Sc. Computer Science / Computer Network / Computer Applications (1st Year) University campus, sub campus Latur
10) M.Sc. System Administration & Networking (1st Year) – Affiliated colleges
11) M.Sc. Computer Management (1st Year) – Affiliated Colleges
12) M.Sc. Computer Science (1st Year) – Affiliated Colleges
13) M.Sc. Dairy Science (1st Year) - Affiliated colleges
14) M.Sc. Electronic (1st Year) - Affiliated colleges
15) M.Sc. Geology (1st Year) – University Campus
16) M.Sc. Geography (1st Year) – University Campus
17) M.Sc. Applied Mathematics (1st Year) – Affiliated Colleges
18) M.Sc. Mathematics (1st Year) – Affiliated Colleges
19) M.Sc. Microbiology (1st Year) - University Campus
20) M.Sc. Microbiology (1st Year) – Affiliated colleges

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21) M.Sc. Physics (1st Year) - University Campus
22) M.Sc. Physics (1st Year) – Affiliated Colleges
23) M.Sc. Statistics (1st Year) - University Campus
24) M.Sc. Statistics (1st Year) – Affiliated colleges
25) M.Sc. Biochemistry (1st Year) – Affiliated Colleges
26) M.Sc. Zoology (1st Year) – Affiliated Colleges

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/एनइपी२०२०/S&T/अक्र/२०२३–२४/ १३०

सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

दिनांक : ३०.०६.२०२३.
प्रत : १) मा. प्राचार्य, सर्व संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
२) मा. संचालक, सर्व संकुले परिसर व उपपरिसर, प्रस्तुत विद्यापीठ
३) मा. प्राचार्य, न्यु मॉडेल डिग्री कॉलेज हिंगोली.
४) मा. समन्वयक, कै. श्री उत्तमराव राठोड आदिवासी विकास व संशोधन केंद्र, किनवट.
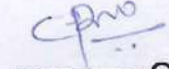प्रत माहितीस्तव :
१) मा. कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. कुलसचिव, प्रस्तुत विद्यापीठ.
३) मा. सर्व आधिष्ठाता, प्रस्तुत विद्यापीठ.
४) सर्व प्रशासकीय विभाग प्रमुख साहाय्यक, प्रस्तुत विद्यापीठ.
५) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

SWAMI RAMANAND TEERTH

MARATHWADA UNIVERSITY, NANDED - 431 606

(Structure and Syllabus of Two Years PG Degree Program with Multiple Entry and Exit Option)

TWO YEAR MASTERS PROGRAMME IN SCIENCE

Subject: Computer Management

Under the Faculty of

Science and Technology

Effective from Academic year 2023 – 2024

(As per NEP-2020)

Swami Ramanand Teerth Marathwada University

Nanded

Affiliated Colleges

Faculty of Science and Technology

NEP-2020 Oriented Structure of Post Graduate Programs

(as per Govt of Maharashtra GR dated 16-05-2023)

M.Sc. Computer Management (affiliated colleges) (2 years full time PG Programs)

Introduced from Academic Year 2023-2024

M.Sc. Computer Management (affiliated colleges) (2 years full time PG Programs)

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science and Technology
NEP-2020 oriented Structure of Two years Post Graduate Program
Subject: M.Sc. Computer Management (M.Sc. CM) (affiliated colleges)
(2 years' full time PG Programs in Affiliated Colleges)
Introduced from Academic Year 2023-2024 **(as per Govt of Maha GR dated 16-05-2023)**

Program Year and Sem	Level	Semester		Faculty			Other courses			Total Sem. credits	Cumu. Credits
			Major / Mandatory /		Electives/		RM	OJT/FP/	RP		
			Theory	Practical	Theory	Practical					
			(04 credits)	(01credits)	(04 credits) (03+01)		(03credits)	(03 Credits)	(04 Credits)		
			SCMP		SCMP						
M.Sc. CM		First Semester	SCMPMC-401 SCMPMC-402 SCMPMC-403	SCMPMCP-401 SCMPMCP-402 SCMPMCP-403	SCMPME-401	---------	SVECR-401 Research Methodology Compulsory	---------	---------	22	22
M.Sc. CM	6.0	Second Semester	SCMPMC-451 SCMPMC-452 SCMPMC-453	SCMPMCP-451 SCMPMCP-452 SCMPMCP-453	SCMPME -451	---------	---------	SCMPMOJ-451	----------	22	44
PG Diploma			24credits + 06 Credits		06 credits +02 Credits		03credits	03credits	----------	**44 credits**	
Exit Option: After completion of First year as above with 44 credits, student will be awarded PG Diploma in Computer Science and Applications ****(for students who have done 03 years UG program)** ****(available from AY 2024-2025)**											

1. Abbreviations : **S- Science, CMPM- COMPUTER Management, D**iscipline **S**pecific **C**ore course (C- Core Course)
2. Abbreviations : **SCMPME- D**iscipline supportive **E**lective **C**ourse   (E- Elective Course)
3. Abbreviations : SVECR: Research Methodology course
4. Abbreviations : SCMPMOJ : On Job Training , Internship/ Apprenticeship or Field Project
5. Abbreviations : SCMPR : Research Project

Syllabus First Semester

Core Courses Code	Title	Remarks Credits
SCMPMC-401	Introduction to Information Technology	04
SCMPMC-402	Programming in C	04
SCMPMC-403	Web Technology	04
SCMPMCP-401	Lab 1: IT Lab	01
SCMPMCP-402	Lab 2: C Lang Lab	01
SCMPMCP-403	Lab 3: Web Tech Lab	01

SCMPME-401	**Choose any one**
	   A. Computer Network
	   B. Statistical Methods
	   C. Data Analytic with Power BI
		03 Theory and 01 Lab

SVECR-401	Research Methodology	03

Syllabus Second Semester

Core Courses Code	Title	Remarks Credits
SCMPMC-451	RDBMS with Oracle	04
SCMPMC-452	OOPS with Java	04
SCMPMC-453	Data Structure	04
SCMPMCP-451	Lab 4: RDBMS Lab	01
SCMPMCP-452	Lab 5: Java Lab	01
SCMPMCP-453	Lab 6: Data Structure Lab	01

SCMPME-451	Choose any one
	   A. Software Engineering
	   B. Windows Server Administration
	   C. PHP and MySQL
		03 Theory and 01 Lab

SCMPMOJ-451	On Job Training , Internship/ Apprenticeship or Field Project	03

M. Sc. First Year, Semester I and II (Level 6.0) : *Teaching Scheme*

	Course Code	Course Name	Credits Assigned per course			Teaching Scheme (Hrs/ week) per course	
			Theory	Practical	Total	Theory	Practical
Major	SCMPMC-401 to SCMPMC-403 and SCMPMC-451 to SCMPMC-453	All Core Course	04	--	**04**	04	--
Elective	SCMPME-401and SCMPME-451	All Elective Courses	03	--	**03**	03	--
Special Courses	SVECR-401 and SCMPMO-451	Research Methodology and On Job Training	03	--	**03**	03	
Major Practical	SCMPMCP-401 to SCMPMCP-403 and SCMPMCP-451 to SCMPMCP-453	All Core labs	--	01	**01**	--	02
Elective Practical	SCMPMEP-401 and SCMPMEP-451	Elective lab	--	01	**01**	--	02
Total Credits per semester			**18**	**04**	**22**	**18**	**04**
Total credits per year			**36**	**08**	**44**	**36**	**08**

M. Sc. First Year, Semester I and II (Level 6.0) :Examination Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9)
		Continuous Assessment (CA)			ESA			
		Test I (4)	Test II (5)	Avg of (T1+T2)/2 (6)	Total (7)	CA (8)	ESA (9)	(10)
SCMPMC401 to SCMPMC-403 and SCMPMC-451 to SCMPMC-453	All core courses	20	20	`20	80	--	--	100
SCMPME-401 and SCMPME-451	All elective courses	15	15	15	60	--	--	75
SVECR-401 and SCMPMOJ-451	Research Methodology	15	15	15	60	--	--	75
SCMPMCP-401 to SCMPMCP-403 and SCMPMCP-451 to SCMPMCP-451	All Core Labs	--	--	--	--	05	20	25
SCMPMEP-401 and SCMPMEP-451	All Elective labs	--	--	--	--	05	20	25

Note : Teaching scheme and Examination scheme for Second year will be elaborated later, along with detailed syllabus of Second Year

Guidelines for Course Assessment:

A. **Continuous Assessment (CA) (20% of the Maximum Marks):** This will form 20% of the Maximum Marks and will be carried out throughout the semester. It may be done by conducting **Two Tests** (Test I on 40% curriculum) and **Test II** (remaining 40% syllabus). Average of the marks scored by a student in these two tests of the theory paper will make his **CA** score (col. 6).

B. **End Semester Assessment (80% of the Maximum Marks):** *(For illustration we have considered a paper of 04 credits, 100 marks and need to be modified depending upon credits of an individual paper)*

   1. **ESA Question paper will consists of 6 questions, each of 20 marks.**
   2. **Students are required to solve a total of 4 Questions.**
   3. **Question No.1 will be compulsory and shall be based on entire syllabus.**
   4. Students need to solve **ANY THREE** of the remaining Five Questions (Q.2 to Q.6) and shall be based on entire syllabus.

C. **Question paper for campus PG and PG in affiliated colleges will be different**

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 course 45 lectures.**

%%%%%

SCMPMC-401 Introduction to Information Technology

Name of Course	M.Sc. (CM) FY
Semester	I
Name of Subject	Introduction Information Technology
Subject Code	SCMPMC-401
Marks	80 Marks
Lectures	50 Lectures

Course Objectives

Through this paper Student should learn basic principles of computer. The paper is designed to aim at importing basic level of Computer.

Course Outcome

To learn Basic Function of Devices like I/O, HDD etc. To Understand the Fundamental of Software and Hardware. Understand the Concept of Operating System and Network.

UNIT I: Introduction to Computer and History 10 Lectures

Definition of Computer, Basic Computer Organization, Characteristics of Computer, Generations of Computer, Types of Computer: - Microcomputer, Minicomputer, Mainframe Computer, Workstations, Client and Server

UNIT II: Computer Peripherals 08 Lectures

Input Devices: - Keyboard, Mouse, Trackball, Joystick, Light pen

Output Devices: - Monitor, Printer, Projector, Biometric Devices

UNIT III: Computer Memory and Storage Devices 08 Lectures

RAM, ROM, Cache Memory, Compact Disk, Digital Versatile Disk, Hard Disk Drive

USB Flash Drive

UNIT IV Operating System 08 Lectures

Definition of operating System, Types of Operating System, Disk Operating System,

Windows Operating System, Linux Operating System

UNIT V Introduction to Computer Network   08
Lectures

Definition of Network, Types of Network: - LAN, MAN, WAN, Data Transmission Modes, OSI Model, TCP IP Model

UNIT VI Introduction to Protocol and Internet   08
Lectures

Http Protocol, FTP, TCP/IP, Web Browser, Types of Web Browser

References: -

1. Fundamental of Computer –5th& 6th Edition, P.K. Sinha, BPB Publication
2. Fundamental of Computer - V. Raja Raman, PHI Publication

SCMPMC-402 Programming in C

Name of Course	M.Sc. (CM) FY
Semester	I
Name of Subject	Programming in C
Subject Code	SCMPMC-402
Marks	80 Marks
Lectures	50 Lectures

Programming in 'C' Objective

It is general purpose and procedure oriented programming language. In which we are able to develop OS and MAC operating system, application software and programming languages. Programming Language are also used to build students logic for programming.

Programming in 'C' Outcomes

To study of structure of programming languages, structure of c program. To study different keyword for making program. To develop programs using operators and control statement. To describe an array. Student are able to develop application software.

UNIT I: Basic of C: 08
Lectures

History, Algorithms & Flowchart, Basic Structure of C program, C Character set, Identifiers & Keywords, Constants, Variables, Data Types, Operators, I/O Statement.

UNIT II: Decision Making & Looping Statements: 08
Lectures

Introduction, Decision making: - If statement, If-Else statements, Nested If-Else statements, switch statement, looping statements: - WHILE statement, DO – while statement, For Statement.

UNIT III: Storage Classes & Arrays: 08
Lectures

Storage class, what is Array? declaration, initialization, One dimensional Array, Two dimensional Array, Passing array elements to a   function.

UNIT IV: Functions & pointers: 08
Lectures

What is a function? Call by Value & Call by References, Recursion, Introduction to pointers, Pointers & Arrays, Pointers to functions, Pointer to pointer, Dynamic Memory Allocation, String Library Function.

UNIT V: Structures & Unions: 08
Lectures

Introduction to structures, Structure variables, Arrays within structure, Structure within structure, Introduction to Union

UNIT VI: File Handling: 08
Lectures

What is File? Creating File, Types of File, Operation on File, Random Access to File

Reference Books:

1. Complete C Reference – Herbert Schildt (Thomson learning publications)
2. Programming in ANSI C – By E. Balagurusamy, Tata McGraw-Hill Education, 2004 ISBN 0070534772, 9780070534773
3. Let Us C - By Yeshwant Kanetkar Infinity Science Press, 8th edition, 2008, ISBN - 1934015253
4. Pointers in C - By Yeshwant Kanetkar, 4th Edition, BPB Publications 2009 ISBN - 9788176563581

Name of Course	M. Sc. (CM) FY
Semester	I
Name of Subject	Web Technology
Subject Code	SCMPMC-403
Marks	80 Marks
Lectures	50 Lectures

UNIT I: Introduction of HTML Documents 8 Lectures

Historical Roots of HTML, Web page, Website, Structure of HTML documents and Basic Tags: HTML, HEAD, TITLE, BODY, Formatting Tags: Paragraph Tags, List tags, HR Tag., Headings Tags, PRE tag, DIV tag, SPAN tag., FONT Tag, ADDRESS tag, MARQUEE tag., Text-Level Elements & other different formatting tags.

UNIT II: Technologies for Web Application 8 Lectures

WWW, Web browser, U.R.L. concept, Web server, Web protocols: HTTP, FTP, Telnet, Hyperlink (Anchor) Tag & it's all attributes, Creating Email Hyperlinks (using mail to anchor)

UNIT III: Use of Image and Table 8 Lectures

The Role of Images on the Web, tag & it's all attributes, Using Images create a links., Tables in HTML: - TABLE, TR, TH, TD tag with example, table with all Attributes

UNIT IV: Basic Interactivity and DHTML 8 Lectures

Frames in HTML: FRAMESET & FRAME tags & its attributes, Simple Frame Example, Forms in HTML: Introduction to forms, FORM element & it's attributes (Action, Method (GET, POST), Name), Form controls: Text Controls, Password Field, Multiline Text Input, Pull-Down Menus, Check Box, Radio Buttons, Scrolled List, Reset Button and Submit button.

UNIT V: DHTML, CSS & JavaScript 8 Lectures

Introduction of DHTML, Ramifications of DHTML, Rollover Buttons, Introduction to Cascading Style Sheets, Types of CSS, Introduction of JAVA Script, Adding script to documents with example, Variables, Use of different variable, Input and Output statements of JAVA Script, Validating form.

UNIT VI: Web Publishing and Advanced HTML Concepts 8 Lectures

Publishing the Site, The Realities of Publishing and Maintaining a Web Site, introduction of Search engine optimization, Meta –Information, Overview of Client/Server Programming on the Web.

Reference Books:

1. HTML The complete Reference (2nd Edition Thomas A Powel Tata McGraw Hill publication)

2. The complete Reference (HTML & XHTML)- 5th Edition Thomas A Powel Tata McGraw Hill publication

SCMPMCP-401	Lab 1: IT Lab

Note – Any 15 practical from the Syllabus

SCMPMCP-402	Lab 2: C Lang Lab

Note – Any 15 practical from the Syllabus

SCMPMCP-403	Lab 3: Web Tech Lab

Note – Any 15 practical from the Syllabus

SCMPME-401 A. Computer Network

Name of Course	M.Sc. (CM) FY
Semester	I
Name of Subject	Computer Network
Subject Code	SCMPME-401 A
Marks	80 Marks
Lectures	50 Lectures

Course Objectives

The main emphasis of this course is on the organization and management of local area networks (LANs). The course objectives include learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems. Students are introduced to computer communication network design and its operations, and discuss the following topics: Open Systems Interconnection (OSI) communication model; error detection and recovery; local area networks; bridges, routers and gateways; network naming and addressing; and local and remote procedures. On completion of the course, students should be able, in part to design, implement and maintain a typical computer network (LAN).

Course Outcome

- Describe the general principles of data communication.
- Describe how computer networks are organized with the concept of layered approach.
- Describe how signals are used to transfer data between nodes.
- Implement a simple LAN with hubs, bridges and switches.
- Describe how packets in the Internet are delivered.
- Analyze the contents in a given data link layer packet, based on the layer concept.
- Design logical sub-address blocks with a given address block.
- Decide routing entries given a simple example of network topology
- Describe what classless addressing scheme is.

Unit-I: Introduction   8 Lectures

What is networking? A Networking Lexicon, Uses of computer Networks, Network Hardware-LAN, MAN, WAN, Wireless Networks, Network Software-Protocol Hierarchy, Wireless Networking: Intangible Media.

Unit-II: LAN Hardware   10 Lectures

Network Interface Card, Twisted Pair Cable, Coaxial Cable, Fiber optic cable, Network Topologies- Bus, Ring, Star, Tree and other Topologies, Variations of Major Topologies, Networking Devices – Repeaters, Bridges, Routers, Gateways, Hub and Switch, Channel Access Methods, Putting data on cables: Access Methods.

Unit-III: LAN Software   08 Lectures

Client-Server Model, File Server, Database Server, Print Server, DHCP Server, DNS Server, Peer-TO-Peer Networks

Unit-IV: Network Standards and Network protocols   08 Lectures

OSI reference model, TCP/IP reference model, IP protocol, SMTP, PPP, FTP, HTTP, SNMP, IP-addresses, Concept of DNS.

Unit-V: Internet   08 Lectures

Definition, Internet verses Intranet, Internet Service Provider, E-mail–Architecture and Services, WWW-Client side and Server side, URL, Messenger, Search Engine.

Unit-VI: Multiplexing, Switching   08 Lectures

Multiplexing – Time division and Frequency division, Switching, Circuit Switching, Packet Switching, Message Switching

Reference Books

1. Gerd E. Keiser", Local Area Networks", Tata McGraw Hill Edition, New Delhi.

2. Andrew S. Tannenbaum," Computer Networks", (Third Edition), Prentice-Hall of India Pvt. Ltd, New Delhi

3. Guide to Networking Essentials, Second Edition, "Ed Tittle, David Johnson", Cengage Learning, 2011, ISBN 1111312524, 9781111312527.

SCMPME-401 B. Statistical Methods

Name of Course	M.Sc. (CM) FY
Semester	I
Name of Subject	Statistical Methods
Subject Code	SCMPME-401 B
Marks	80 Marks
Lectures	50 Lectures

Learning Objectives:
    i.   To inspire knowledge across different areas in Statistics and Actuarial Science.
   ii.   To impart knowledge on Statistical concepts like Data Collection, Measures of Central Tendency and Dispersion, Probability and Distributions, Statistical Methods, Inference, Sampling methods, Experimental Designs, Economical and Vital Statistics, SQC, reliability and Operations Research.
  iii.   To impart knowledge on Actuarial Science concepts like basics of Economics, Financial Accounting and Mathematics, Surviving models, life contingences, Business communication, Actuarial Statistics , Mortality and Insurance,

Course Outcomes:
    i.   Understand the have the basic knowledge on data collection and various statistical elementary tools.
   ii.   Have the critical thinking in the theory of probability and its applications in real life problems

UNIT I: Introduction   **8 Lectures**

Definition of Statistics, Importance of Statistics, Limitation of Statistics, Scope of Statistics (Computer Science, Industry, Economics, Social Science)

UNIT II: Fundamental of Statistics   **8 Lectures**

Collection of Data, Types of Data, Construction of Frequency, Cumulative and Relative Frequency distributions. Graphical representation of Frequency distribution: Histogram, Frequency Polygon, Frequency Curve and Cumulative Frequency curves, Diagrammatic representations: Simple bar, Subdivided bar and Pie diagrams

UNIT III: Measures of Central Tendency   **8 Lectures**

Concept of central tendency, Arithmetic Mean: Definition, Formulae and computation for ungrouped and grouped data, Merits and Demerits. Weighted Arithmetic Mean, Median: Definition, Formulae and Computation for ungrouped and grouped data, Merits and Demerits Mode: Definition, Formulae and Computation for ungrouped and grouped data, Merits and Demerits.

UNIT IV: Measures of Dispersion: **8 Lectures**

Concept of Dispersion. Range: Definition, Formulae and Computation for ungrouped and grouped data. Standard Deviation: Definition, Formulae and Computation for ungrouped and grouped data. Variance: Definition, Formulae and Computation for ungrouped and grouped data Coefficient of variance: Definition, Formulae and Computation for ungrouped and grouped data.

UNIT V: Probability   **8 Lectures**

Permutation and combination, Sample space, Events and Types of events, Classical definition of probability and axioms of probability, Theorems on Probability: i) $0 \leq P(A) \leq 1$ ii) $P(A) + P(A')=1$ iii) $P(A \cup B)= P(A)+ P(B)$ iv) $P(A \cup B)= P(A)+P(B)-P(A \cap B)$

UNIT VI: Correlations and regressions   **8 Lectures**

Definition of Correlation & Types, Karl Pearson's coefficient of correlations for ungrouped data and problems, Definition of Regression.

References:

1) Fundamental of Statistics S. C. Gupta Himalaya Publication (6th revised & Enlarged Edition)

2) Statistical Methods S. P. Gupta Sultan Chand & Sons Publication (37th Revised Edition)

Name of Course	M.Sc. (CM) FY
Semester	I
Name of Subject	Data Analytic with Power BI
Subject Code	SCMPME-401 C
Marks	80 Marks
Lectures	50 Lectures

Course Objectives

The course objectives are to import, transform and cleanse data using Power Query Editor, build a data model for self-service reporting, manipulate the model with DAX , publish and share visualizations.

Course Outcome

On completing this Course, learners will be able to:

- Identify the primary components of the Power BI interface: reports, data, and model views
- Import Excel data and build basic visuals
- Publish a desktop report to the Power BI Service
- Identify common challenges in Power BI data models, implement smart solutions, and avoid common mistakes

UNIT I: Introducing Power BI and Importing Data into Power BI Desktop

Why Use Power BI?, The xVelocity In-Memory Analytics Engine, Setting Up the Power BI Environment, Exploring the Power BI Desktop Interface, Importing Data from Relational Databases,

Importing Data from Text Files, Importing Data from a Data Feed, Importing Data from Analysis Services

UNIT II: Data Munging with Power Query

Discovering and Importing Data, Transforming, Cleansing, and Filtering Data, Merging Data, Appending Data

Splitting Data

Unpivoting Data

Inserting Calculated Columns

UNIT III: Creating the Data Model

What Is a Data Model?

Creating Table Relations

Creating a Star Schema

Understanding When to Denormalize the Data

Making a User-Friendly Model

UNIT IV: Creating Calculations with DAX

What Is DAX?

Implementing DAX Operators

Working with Text Functions

Using DAX Date and Time Functions

Using Informational and Logical Functions

Getting Data from Related Tables

Using Math, Trig, and Statistical Functions

Tips for Creating Calculations in Power BI

UNIT V: Visualizations

Why Visualizations

Visualization types, Create and Format Bar and Column Charts

Create and Format Stacked Bar Chart Stacked Column Chart Create and Format Clustered Bar Chart, Clustered Column Chart, Create and Format 100% Stacked Bar Chart, 100% Stacked Column Chart Create and Format Pie and Donut Charts

Create and Format Scatter Charts

Create and Format Table Visual, Matrix Visualization, Line and Area Charts

Create and Format Line Chart, Area Chart, Stacked Area Chart, Combo Charts

Create and Format Line and Stacked Column Chart, Line and Clustered ColumnChart

Create and Format Ribbon Chart, Waterfall Chart, Funnel Chart

UNIT VI: Power BI Service and Creating Dashboards

Power BI Service Introduction, Power BI Cloud Architecture

Creating Power BI Service Account, SIGN IN to Power BI Service Account

Publishing Reports to the Power BI service, Import / Getting the Report to PBI ServiceMy

Workspace / App Workspaces Tabs

DATASETS, WORKBOOKS, REPORTS, DASHBOARDS

Working with Datasets, Creating Reports in Cloud using Published Datasets

Creating Dashboards

Pin Visuals and Pin LIVE Report Pages to Dashboard

Advantages of Dashboards

Interacting with Dashboards

Formatting Dashboard

Sharing Dashboard

1. Mastering Microsoft Power Bi: Expert techniques for effective data analytics and business intelligence Paperback –: Adobe Reader, 1 January 2018 by Brett Powell (Author)
2. Introducing Microsoft Power BI by Alberto Ferrari and Marco Russo | 7 July 2016

Name of Course	M.Sc. (CM) FY
Semester	I
Name of Subject	Introduction Information Technology
Subject Code	SCMPMC-401
Marks	75 Marks (3 Credits)
Lectures	50 Lectures

Course Objectives

The main objective of this course is to introduce the basic concepts in research methodology in Social science. This course addresses the issues inherent in selecting a research problem and discuss the techniques and tools to be employed in completing a research project. This will also enable the students to prepare report writing and framing Research proposals.

Course Outcomes
- Students who complete this course will be able to understand and comprehend the basics in research methodology and applying them in research/ project work.
- This course will help them to select an appropriate research design.
- With the help of this course, students will be able to take up and implement a research project/ study.
- The course will also enable them to collect the data, edit it properly and analyse it accordingly. Thus, it will facilitate students' prosperity in higher education.
- The Students will develop skills in qualitative and quantitative data analysis and presentation.
- Students will be able to demonstrate the ability to choose methods appropriate to research objectives.

UNIT I: Introduction, the Purpose and Product of Research

What is research?, Evaluating Research, The 6Ps of research, Reasons for doing Research, possible products, Finding and choosing research topics, evaluating the purpose and product of research.

UNIT II: Overview of the Research Process, Internet Research

A model of the research process, Alternative models of the research process, evaluating the research process, Background of the Internet and WWW, Internet research topics, The Internet and a literature review, The Internet and research strategies and methods, Internet research, the law and ethics.

UNIT III: Reviewing the literature, Surveys and Design Creation

Purpose of literature review, literature resources, The Internet and literature reviews, conducting literature reviews, evaluating literature reviews, Define Surveys, Planning and Designing surveys, the internet and surveys, Example of Surveys, Defining design and creation, Planning and conducting design and creation research, Creative computing and digital art.

UNIT IV: Experiments, Case studies, Action Research

Defining experiments, Planning and conducting experiments, The internet and experiments, Defining case studies, Planning and conducting case studies, The internet case studies, Defining Action research, Planning and conducting Action research, The internet and Action research

UNIT V: Interviews, Observations, Questionnaires

Defining Interviews, Planning and conducting Interviews, Group Interviews Internet based Interviews, Defining Observations, Planning and conducting systematic Observations, Planning and conducting participant Observations, The internet and Observations.

UNIT VI: Quantitative data analysis, Qualitative data analysis and Presentation of Research

Defining Quantitative data analysis, Types of Quantitative data analysis, Data coding, Visual aids for Quantitative data analysis, Using statistics for Quantitative data analysis, Qualitative data analysis-Introduction, Analysis textual data, Analysing non-textual qualitative data, Grounded theory, Presentation of Research- writing up the research, conference paper presentations, Posters and exhibitions, software demonstrations, Presenting yourself, PhD vivas, Research Ethics, Plagiarism, software to detect plagiarism

References:
1. Researching Information System and Computing by Briony J Oates, SAGE Publications, ISBN 978-81-7829-759-0

Semester II

SCMPMC-451 RDBMS with Oracle

Name of Course	M.Sc. (CM) FY
Semester	II
Name of Subject	RDBMS with Oracle
Subject Code	SCMPMC-451
Marks	80 Marks
Lectures	50 Lectures

Course Objectives:

1. To understand the features of Relational database.

2. To describe data models and schemas in DBMS.

3. To use SQL- the standard language of relational databases for database operations.

4. To understand the functional dependencies and design of the databases.

Course Outcome:

1. To study the basic concepts of relational databases

2. Learn and practice data modeling using the entity-relationship and developing database designs.

3. Understand the use of Structured Query Language (SQL) and learn SQL syntax for writing queries. 4. Apply normalization techniques to normalize the databases.

Unit I Introduction to Database System

Database and Users: Introduction (Basic Concepts: Data, Database, Database systems, Database Management Systems), Characteristics of Database Approach, Actors on Scene, Workers behind the Scene, Advantages of using the DBMS approach Database System Concepts and Architecture: Data Models, Schemas, Instances, the three schema architectures and data independence, Database Languages and interfaces, Database System environment, Centralized and client / Server Architecture for DBMS, Classifications of Database Management Systems

Unit II Entity Relationship Diagram

Using high level conceptual data models for database design (Design Phases of database design), Entity types, Entity Sets, Attributes and keys, Relationship Types, Relationship sets, Roles and structural constraints, Weak entity Types, Refining the ER diagram for company Database, Entity Relationship Diagram Naming conventions Design issues, Example of other Notation: UML class diagram, Relationship types of degree higher than 2 Subclasses, Super Classes, Inheritance Specialization and Generalization Relational Database design by ER and EER to Relational Mapping, Mapping EER model construct to Relations

Unit III Database Design

Informal Design Guidelines for Relational Schema, Functional Dependencies, Normal Forms based on Primary keys, General definitions of 1NF, 2NF and 3NF, Boyce-Codd Normal Forms (BCNF), Multi-valued Dependency and Fourth Normal For.

Unit IV Transaction processing

Introduction to Transaction Processing Concepts: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, characterizing Schedules based on recoverability and Serializability Relational Model concepts: Relational Model concepts, Relational Model constraints and Relational Database Schemas

UNIT V Introduction to SQL:

Background, Basic Data types in SQL, Types of SQL Commands (DDL, DML, DCL, DQL, TCL), Basic Structure of SQL Queries, Table Creation, Data insertion, Data Updating, Data Selection, Changing Table Structure, WHERE Clause, DISTINCT Clause, Using Column Aliases, Working with Views a. Creating View on Tables b. Creating View on Views c. Updating Views d. Altering Views, SQL Functions a. Single Row Functions (Character Functions, Case Manipulation, Character Manipulation Number Functions, Date Functions, Conversion Functions) b. Multiple Row Functions

UNIT VI Introduction to PL/SQL

Predefined function, Text Function, Number Functions, Aggregate Function, PL- SQL Stored Procedure, Creating Procedures • Using Parameters in Procedures • Passing Parameters, Cursor, Trigger.

Reference Books

1. An Introduction to Database Systems By Bipin C Desai (Galgotia Pubclication)

2. Database System Concepts By Abraham Silberschatz, Henry F Korth, S. Sudarshan (McGRAW Hill Publication) 3. SQL, PL/SQL the Programming Language of Oracle by Ivan Bayross

SCMPMC-452 OOPS with Java

Name of Course	M.Sc. (CM) FY
Semester	II
Name of Subject	OOPS with Java
Subject Code	SCMPMC-452
Marks	80 Marks
Lectures	50Lectures

UNIT I: Introduction and Overview of Java Language   10 Lecture

Java Milestone, Java Features, JVM, Java Environment, Java Programming Structure, Java Tokens, Variables, Java Data type, Operators in Java, Control Structure, Conditional Statements, Looping Statements, Arrays

UNIT II: Introduction to Classes and Objects   08 Lecture

Class and objects, this keyword, Method overloading, Constructors Static keyword

UNIT III: Inheritance   07 Lecture

Inheritance Basics, Access specifier, Using Super keyword, Types of Inheritance, abstract Keyword, final keyword

UNIT IV Packages and Interfaces   06 Lecture

Interface, Extending and implementing Interface, Package, creating user define package.

UNIT V Exception and String Handling   05 Lecture

Exception Handling Mechanism, Types of Exception, Using Try and catch block, Multiple catch block, User defined Exception, String and String Buffer class, String predefined methods, String Buffer methods

UNIT VI I/O Stream classes & JDBC   08 Lecture

I/O Stream classes, Byte Stream and Character Stream classes, File input string, File Output Stream, Introduction to JDBC, types of driver.

Reference Books:

1. **"The Complete Reference- Java2"**, Fourth Edition, 2001, -H. Schildt, Tata McGraw Hill
2. **"Java : How to Program Java2"**, Second Edition, 2001, -Dietel and Dietel, Pearson Education.
3. **"Java Example in Nutshell"**, Third Edition,2001,D.Hanagan,'O' Reilly
4. **"A Programmers Guide to Java Certification"**, First Edition, 1999-K.Mughal and R.W.Rasmuessen, Pearson Education
5. "Java Foundation Classes" -M.T.Nelson, Tata McGraw Hill.

SCMPMC-453 Data Structure

Name of Course	M.Sc. (CM) FY
Semester	II
Name of Subject	Data Structure
Subject Code	SCMPMC-453
Marks	80 Marks
Lectures	50Lectures

Unit -I Introduction to Data Structures:

Algorithms and Flowcharts, Basics Analysis on Algorithm, Complexity of Algorithm, Introduction and Definition of Data Structure, Classification of Data, Arrays, Various types of Data Structure, Static and Dynamic Memory Allocation, Function, Recursion. Arrays, Pointers and Strings: Introduction to Arrays, Definition, One Dimensional Array and Multidimensional Arrays, Pointer, Pointer to Structure, various Programs for Array and Pointer. Strings. Introduction to Strings, Definition, Library Functions of Strings

Unit-II Stacks and Queue

Introduction to Stack, Definition, Stack Implementation, Operations of Stack, Applications of Stack and Multiple Stacks. Implementation of Multiple Stack Queues, Introduction to Queue, Definition, Queue Implementation, Operations of Queue, Circular Queue, De-queue and Priority Queue.

Unit-III Linked Lists

Introduction, Representation and Operations of Linked Lists, Singly Linked List, Doubly Linked List, Circular Linked List, And Circular Doubly Linked List

UNIT IV: Trees

Introduction to Tree, Tree Terminology Binary Tree, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, Tree Traversal, Threaded Binary Tree, AVL Tree B Tree, B+ Tree.

UNIT V: Graphs:

Introduction, Representation to Graphs, Graph Traversals, Shortest Path Algorithms.

UNIT VI: Searching and Sorting:

Searching, Types of Searching, Sorting, Types of sorting like quick sort, bubble sort, merge sort, selection sort. Hashing: Hash Function, Types of Hash Functions, Collision, Collision Resolution Technique (CRT), Perfect Hashing

SCMPMCP-451	Lab 4: RDBMS Lab

Note – Any 15 practical from the Syllabus

SCMPMCP-452	Lab 5: Java Lab

Note – Any 15 practical from the Syllabus

SCMPMCP-453	Lab 6: Data Structure Lab

Note – Any 15 practical from the Syllabus

SCMPME-451	Choose any one
	    D. Software Engineering
	    E. Windows Server Administration
	    F. PHP and MySQL
		03 Theory and 01 Lab

A.
A. Software Engineering

Name of Course	M. Sc. (CM) FY
Semester	I Sem.
Name of Subject	Software Engineering
Subject Code	SCMPME-451 A
Marks	75
Lectures	50

Course Objectives:

- To develop software engineering skills and testing plans.

- To understand system concepts and its application in Software development.

- To enhance skills of designing and testing software.

- To learn technical skills to assure production of quality software.

Course Outcomes:

- Ability to learn various methods of software development

- Ability to apply various software testing techniques

UNIT-I - Introduction to Software Engineering   08 Lecture

The Evolving Role of Software, Software, Software Characteristics, Software Applications, Software Evolution, Software Crisis & Horizon, Software Myths

UNIT-II - Process of Software   08 Lecture

Software Engineering, Software Process, The Waterfall Model, Incremental Process Models Evolutionary Process Models, Spiral Model

UNIT-III - A Generic View of Process   08 Lecture

Software Engineering – A Layered Technology, Process Framework, Personal and Team Process Models, Personal Software Process (PSP), Team Software Process (TSP), Process Technology, Product and process

UNIT-IV - AGILE DEVELOPMENT   10 Lecture

What Is Agility? What Is an Agile Process? The Politics of Agile Development, Agile Process Models, Feature Driven Development (FDD

UNIT-V - Software Engineering Practice   08 Lecture

Software Engineering Practice, The Essence of Practice, Core Principles, Communication Practices, Planning Practices, Modeling Practices, Analysis Modeling Principles, Design Modeling Principles

UNIT-VI - System Engineering   08 Lecture

Computer-Based Systems, The System Engineering Hierarchy, System Modeling, System Simulation

References:

1. Software Engineering R.Pressmen M C Graw Hill

2. Software Engineering 7th / 8th Edition IAN Sommerville Pearson Editio

Name of Course	M. Sc. (CM) FY
Semester	I Sem.
Name of Subject	Windows Server Administration
Subject Code	SCMPME-451 B
Marks	75
Lectures	50

Course Objectives:
 Configure and Troubleshoot Domain Name System
  Maintain Active Directory Domain Services
  Manage User and Service Accounts
 Implement Group Policy Infrastructure
Course Outcomes:
 Best Practices for domain configuration
 Best Practices for group policy.

Unit I: Installing and configuring servers

Install servers, configure servers, Configure local storage (Emphasis on windows server 2019)

Unit II: Configuring server roles and features

Configure file and share access, configure print and document services, Configure servers for remote management

Unit III: Configuring Hyper-V

Create and configure virtual machine settings Create and configure virtual machine storage, Create and configure virtual networks

Unit IV:Deploying and configuring core network services

Configure IPv4 and IPv6 addressing, Configure servers, Deploy and configure the DNS service

Unit V: Installing and administering Active Directory

Install domain controllers, Create and manage Active Directory users, Create and manage Active

Directory groups

Unit VI: Creating and managing Group Policy

Create Group Policy Objects, configure security policies, Configure application restriction policies,

Configure Windows Firewall

Reference Books:

1. MCTS Self-Paced Training Kit (Exam 70-410): Installing and Configuring Windows Server 2019

Name of Course	M. Sc. (CM) FY
Semester	I Sem.
Name of Subject	PHP and MySQL
Subject Code	SCMPME-451 C
Marks	75
Lectures	50

Objectives:

- Learn Core-PHP, Server Side Scripting Language.
- Learn to design dynamic and interactive Web pages.
- Learn PHP-Database handling.

Outcomes:

- Able to design dynamic and interactive web pages, websites.
- Able to run PHP scripts on server and retrieve results.
- Able to handle databases like MySQL using PHP in web sites.

UNIT I Introduction to PHP   **8 Lectures**

Introduction to PHP , History and Features of PHP, Installation & Configuration of PHP, Embedding PHP code in Your Web Pages ,Sending Data to the Web Browser, Data types in PHP, Keywords in PHP, Using Variables, Constants in PHP ,Expressions in PHP, Operators in PHP.

UNIT II. Programming with PHP   **8**

Conditional statements: if, if-else, switch, The ? Operator Looping statements: while Loop, do...while Loop, for Loop, Arrays in PHP: Introduction- What is Array?, Types of Arrays: Using Array Functions, Including and Requiring Files- use of Include() and Require(), Implicit and Explicit Casting in PHP.

UNIT III: Using Functions, Forms in PHP   **8**

User define Functions in PHP, Strings in PHP: String Functions, Creating HTML Form, Handling HTML Form data in PHP.

UNIT IV: Using OOPs Concept   **8**

What is Class & Object? Creating and accessing a Class & Object, Object properties, and object methods, Function Overloading, Constructor and Destructor, inheritances.

UNIT V: Database Handling Using PHP with MySQL   **8**

Introduction to MySQL: Database terms, Data Types, Accessing MySQL –Using MySQL Client and Using phpMyAdmin, MySQL Commands   , Using PHP with MySQL: PHP MySQL Functions, connecting to MySQL and Selecting the Database, Executing Simple Queries, Retrieving Query Results, Counting Returned Records, Updating Records with PHP.

UNIT VI Web Application Security   **8**

Using Cookies, Using Sessions, Sessions and Cookies, Improving Session Security, Form Validation, Handling HTML, Validating Data by Type, Form Validation with JavaScript.

References:

1. PHP &MySQL for Dynamic Web Sites- Fourth Edition By Larry ULLman

2. Learning PHP, MySQL and JavaScript By Robin Nixon -O‟REILLY Publications

3. Programming PHP By Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre

4. SAMS Teach yourself PHP in 24 hours, Author: Matt Zandstra, Sams Publishing.

SCMPMOJ-451	On Job Training , Internship/ Apprenticeship or Field Project	03

On Job Training, Internship/ Apprenticeship or Field Project should be assigned to student