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Model curriculum structure for 4 year UG programs with fixed subjects for Minor in Computer

Sem	Major (Offline)	Minor (Blended Mode) (Computer chain)	Inter Disciplinary (Offline)	Ability Enhancement (Offline)	Skill Enhancement (Online /Sessional)	Common Value added Course (SESSIONAL)	Total credits
I	2 sub x 5 credits	MIC101: Computer Fundamental (3 credits)	Any one from GE baskets Basket A or D (3 credits)	English & Professional Communication (2 credits)	Life Skills & Personality Development (2 credits)	Yoga/ Health & Wellness/ Sports / Physical Fitness and Wellness/Community Services (2 credits)	22
II	2 sub x 5 credits	MIC201: Management Information System (3 credits)	Any one from GE baskets Basket B or E (3 credits)	Modern Indian Languages and Literature (2 credits)	IT Skills / Monetizing Social Media or Design Thinking (2 credits)	Critical Thinking / NSS/ Mental Health/ Environmental Studies (2 credits)	22
III	2 sub x 5 credits	MIC301A/B: Word and PowerPoint & Spreadsheet Application with Excel/ R programming & Data Analytics (4 credits)	Any one from GE baskets Basket C or F (3 credits)	The Constitution, Human Rights and Law (2 credits)	Understanding basics of Cyber Security (2 credits)		21
IV	2 sub x 4 credits 1 sub x 5 credits	MIC401A/B/C: Basics of Operating System/ Database Management with SQL/ PHP Programming & Web Development (4 credits) MIC402A/B/C: Graphic Design with Photoshop and Illustrator/ Unix And Shell		Society Culture and Human Behavior / Universal Human Values (UHV) (2 credits)			23

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		Programming/ Advanced Excel & Data Analytics (4 credits)					
V	2 sub x 5 credits	MIC501A/B: Cloud Computing /Introduction to Computer Network (4 credits)				Internship to be started after exam of 4th sem (sem break) and completed within 5th sem (weekends) (4 credits)	22
		MIC502A/B: E-commerce and Application (4 credits)					
VI	2 sub x 5 credits 1 sub x 4 credits	MIC601A/B: Web Development with HTML and CSS/ Data Mining & Data Warehousing (4 credits)					22
		MIC602A/B: Internet and Networking /ERP (4 credits)					
VII	2 sub x 5 credits 1 sub x 4 credits	MIC701A/B/C: Software Project Management /Introduction To Cyber Security and Cyber Laws/ Machine Learning with Python (4 credits)					22
		MIC702A/B/C: Digital Marketing/ Data Analysis and Interpretation// Data Analysis & Reporting using SAS (4 credits)					
VIII	2 sub x 5 credits					Research project 12 credits	22
	19 sub - 91 credits	**11 sub – 42 credits**	**3 sub – 09 credits**	**4 sub – 08 credits**		**3 sub & Int & Proj - 22 credits**	**2 sub – 4 credits**	**176**

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Note:

Normally all 5 credit courses will be either theory (3) + practical (2) [100+100 marks] or theory (4) + tutorial (1) [100 marks]

Normally all 4 credit courses will be either theory (3) + tutorial (1) or theory (4) [100 marks]

Normally all 3 credit courses will be theory (3) – Inter disciplinary (5 to 6 baskets) [100 marks]

Normally all 2 credit courses AEC/SEC/CVA would be theory or online/sessional course

4th year subjects could be foundation of Master's program (as masters would be of 1 year after 4 years UG)

7/8th semester Major subjects could include Projects in core, if required

100/200/300/400 level should be maintained as per UGC document

For online course (Skill Enhancement Course) 2 credits=30 hours.

Programme Outcomes for Minor Courses

	Programme Outcomes	MINOR-1	MINOR-2	MINOR-3	MINOR-4	MINOR-5	MINOR-6	MINOR-7	MINOR-8	MINOR-9	MINOR-10	MINOR-11
1	Values for life and character building			✔				✔		✔	✔	✔
2	Disciplinary knowledge	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
3	Communication skills		✔	✔	✔		✔	✔	✔	✔		✔
4	Critical thinking	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
5	Problem Solving	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
6	Analytical Reasoning	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
7	Research related skills	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

8	Cooperation/Teamwork	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
9	Scientific Reasoning	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
10	Reflective Thinking	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
11	Information/Digital Literacy	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
12	Self-directed Learning	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
13	Moral and Ethical Awareness/Reasoning	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
14	Leadership Readiness/Qualities	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
15	Lifelong learning	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
16	Professional Skills	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Semester I

Detailed Syllabus

Course: Computer Fundamental	
Course Code: MIC101	Semester: I
	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Lecture: 3	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 3	Practical/Seasonal internal continuous evaluation: 0
	Practical/Seasonal external examination: 0

Sl. No.	Course Objective
1	To develop understanding of computer hardware and software components.
2	To develop understanding of different operating systems and their functionalities.
3	To develop understanding of computer networking and its importance in modern computing.
4	To develop understanding of algorithm/pseudocode concepts and develop problem-solving skills.

	Course Outcomes	Mapped module/Unit
CO 1	Student should have a solid understanding of computer hardware and	U1, U2

	software components.	
CO 2	Student should have a good knowledge of various operating systems and their functionalities effectively.	U3
CO 3	Student should have a good knowledge of networking principles and configurations.	U2, U5
CO 4	Student should have a good knowledge of implementing the basic algorithm concepts to solve computational problems.	U4

Learning Outcome/Skills:

The candidate will be able to gain a thorough knowledge on the fundamental concepts of computer and its allied factors like hardware, software and programming languages for the random application in practical life.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	8	15	1	NA
U2	10	20	1, 2	NA
U3	8	25	1, 2, 3	NA
U4	12	25	1, 2	NA
U5	7	15	1, 2	NA
	45	100%		

Course Code:	MIC101	
Course:	Computer Fundamental	Credits:3.0
	Contents	
Chapter	**Name of the topic**	**Hours**
Unit-I	Basic Computer Concepts – Different generations of computer hardware, Modern taxonomy of computers; Hardware and software; Programming languages, Overview of computer systems and their components, Evolution of computers and their impact on society, Classification of computers (mainframes, personal computers, mobile devices), General idea of information and communication technologies, Information system development process.	8
Unit-II	Computer Hardware – Input and Output devices; Memory (or storage) devices; Central Processing Unit. Input / Output devices: keyboard, mouse, light pen, barcode readers, scanners, MICR, OCR, voice recognition and handwriting recognition systems; visual display terminals, printers, plotters etc. Storage devices: Primary storage – RAM, ROM, EEROM, PROM, EPROM; Secondary storage – direct access devices, serial access devices: hard disks, floppy disks, magnetic tape, CD-ROM, DVD; Cache memory and Virtual memory. Central Processing Unit – Control Unit; Arithmetic and Logic Unit; Decoders; Registers; Machine Instructions; Stored program concept; Program execution: Fetch-Decode-Execute cycle; Arithmetic, logical and shift operations.	10
Unit-III	Meaning of software; broad classification of software; system software and application software; utilities. Systems software – Operating systems: Basic idea of an OS; OS as a resource manager – memory management, input/output management, secondary storage management, processor management, program management, network management; Brief introduction to different types of operating systems like DOS, Windows, Unix, Linux etc. Application software – System development tools,	8

	Utilities, Application packages, User- written programs.	
Unit-IV	Programming languages and Algorithms – The concept of programming; pseudocode and flowcharts; structure of programs; program development guidelines; programming languages – machine language, assembly languages, high-level languages (procedural and object-oriented languages), fourth generation languages; object code and executable codes; compilers, translators, assemblers; Algorithms – Basic concept; Some typical algorithms – Finding the sum of a series, checking whether a number is prime or not, creating an array of numbers and displaying the largest element in the list, sorting a given set of numbers. (The algorithms may be implemented using either pseudocode or a high-level programming language).	12
Unit-V	Computer Applications: Essential features of computer systems and structures required for office automation, communications, control systems, data acquisition, interactive multimedia, LAN, WAN, MAN networking.	7
	Total	**45**

List of Books

Name of Author	Title of the Book	Name of the Publisher
N.S. Gill	Handbook of Computer Fundamentals	Khanna Publishing House
P.K.Sinha	Computer Fundamentals	BPB Publication.
V.Rajaraman	Fundamentals of Computers	PHI, Sixth Edition

Course: Management Information System	
Course Code: MIC201	Semester: II
	Maximum Marks: 100

Teaching Scheme	Examination Scheme
Lecture: 3	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 3	Practical/Seasonal internal continuous evaluation: 0
	Practical/Seasonal external examination: 0

Sl. No.	Course Objective
1	To gain an understanding of the role and importance of management information systems in organizations.
2	To understand fundamental concepts and theories related to information systems and their applications in management.
3	To understand the skills to analyse, design, and implement effective information systems to support decision-making and organizational processes.
4	To understand emerging trends and technologies in management information systems and their potential impact on organizational efficiency and competitiveness.

	Course Outcomes	Mapped module/Unit
CO 1	Students should have a good understanding of the role and importance of management information systems in organizational decision-making and strategic planning.	U1
CO 2	Students should have a good understanding on different types of information system and ERP.	U1, U2
CO 3	Students should have a good understanding on technology to enhance operational efficiency and improve decision-making processes.	U1, U3, U4
CO 4	Student should stay updated with emerging trends and advancements in management information systems, enabling adaptation to changing business environments.	U4
CO 5	Students should have a good understanding on networking, security threads and understand risk management.	U5

Learning Outcome/Skills:

The candidate will be able to gain a detailed knowledge on the importance and the effectiveness of management information system including the concepts of software development, data communication and other relevant spheres and applications.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	6	20	1	NA
U2	8	15	1, 2	NA
U3	8	25	1, 2	NA

U4	11	15	1, 2, 3	NA
U5	12	25	1, 2, 3	NA
	45	100%		

Course Code:	MIC201	
Course:	**Management Information System**	Credits:3.0

Chapter	Name of the Topic	Hours
UNIT I	Introduction, Data, Information, and Knowledge, Information Technology - Concept, Features and Components, Information Systems - Concept and types of Information Systems, Role of IT in business and society. MIS Concept, evolution and meaning of MIS; Information system for competitive advantage, MIS function in an organization. Limitations of MIS.	6
UNIT II	Information and Managerial Effectiveness: Information as a corporate resource, types of information – operational, tactical and strategic; Levels of management and information needs of management; Quality of information; Information systems for finance, marketing, manufacturing, human resource areas.	8
UNIT III	Understanding information system; concepts; sub-systems and super-systems; Types of information systems, Transaction processing systems, MIS decision support systems, Executive support system; Enterprise Resource Planning (ERP)(Features, merits, issues and challenges in implementation).	8

UNIT IV	System Development Life Cycle: Sequential Process of software development; Waterfall model. Development and Management of Data Bases: Relation databases, DDL, DCL, DML, Data Base Management Systems (DBMS) and their components, Concept of entity and relationships, ER Diagram, Data Model, Data dictionary, Introduction to SQL Queries.	11
UNIT V	Data Communication and Networking: Uses of computer networks, types of networks, network topologies; Network Devices, Intranets, Internet and Extranet. Security Issues Relating to Information Systems: Threats to information systems; Vulnerability, risk and control measures, Firewall, Antivirus, Risk Management,	12
Total:		45

List of Books

Sr. No.	Name of Author	Title of the BOOK	Publication
1	C. S. V. Murti	Management Information System	Himalaya Publishing House.
2	A.K. Gupta	Management Information System	S Chand.
3	Oka Miland M & Murty	Management Information System	Oxford University Press
4	Laudon, Laudon, Dass,	Management Information Systems	Pearson

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Course: Word, PowerPoint & Spreadsheet Application with Excel	
Course Code: MIC301A	**Semester: III**
	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Lecture: 4	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 4	Practical/Seasonal internal continuous evaluation: 0
	Practical/Seasonal external examination: 0

Sl. No.	Course Objective	
1	To develop understanding of integrating Word, Excel, and PowerPoint for document creation and presentation.	
2	To develop understanding of working efficiently with the applications, including keyboard shortcuts and time-saving techniques.	
3	To develop understanding of problem-solving skills using Excel and professional presentation creation and delivery.	
4	To develop understanding of practices for organizing, saving, and sharing files created in Word, Excel, and PowerPoint.	
	Course Outcomes	**Mapped module/Unit**

CO 1	Students should have a solid understanding of how to Integrate Word, Excel, and PowerPoint for comprehensive document creation and presentation.	U1,U3,U5
CO 2	Students should have a good understanding of how to work efficiently with the applications using keyboard shortcuts and time-saving techniques.	U1,U2
CO 3	Students should have a good understanding of how-to solve problems related to troubleshooting in document creation and presentation development.	U5,U6
CO 4	Students should have a good understanding of how to apply best practices for organizing, saving, and sharing files created in Word, Excel, and PowerPoint.	U2,U4,U6

Course Code:	MIC301A	
Course:	**Word and PowerPoint & Spreadsheet Application with Excel** Credits: 4.0	
	Contents	
Chapter	**Name of the Topic**	**Hours**
Unit-I	**Word** Introduction on Word, File operations (Opening, Creating, Sorting, Closing), Text editing (Cut / Move, Copy, Undo, Redo), Text formatting (Text color, Text border, Advanced formatting, adjusting space between characters, Positioning the character, Superscript, Subscript, Raised, Lower of text, Change case), Page setup, Print preview. Paragraph alignment, Line spacing, Indent, Drop cap, Border and shading, Bullets and Numbering, Find and Replace and Go to.	**10**

Unit-II	**Word** Spelling and Grammar, Auto text, Auto correct, Word count, Text background, break, columns, Header Footer, Inserting object / picture / symbol / drawing and editing, WordArt, Tab setting. Creating of Table, Selecting, Moving, Typing, Inserting row / columns in a table, Applying Border, Sorting, Table auto format, Merging the cells, Converting table to text and vice versa, Cell coloring, Mail merge, different views, ruler, zooming.	**10**
Unit-III	**Power Point** Introduction to PowerPoint , Overview of presentation software and its applications, Introduction to PowerPoint interface and features, Creating, saving, and opening presentations, Working with slides, text boxes, and placeholders, Formatting text, shapes, and images, Using templates and themes for visual enhancement, Choosing appropriate slide layouts, Customizing slide backgrounds and colors, Adding and formatting images, charts, and graphs, Using animation and transition effects, Master slides and slide numbering, Design principles for effective presentations	**10**
Unit-IV	**Power point** Inserting audio and video files, Editing and trimming multimedia elements, Adding hyperlinks and action buttons, Creating interactive and engaging presentations, Running and navigating slide shows, Setting up slide show options (timings, loops, narrations), Using presenter view and annotations, Rehearsing timings and managing slide transitions, Tips for delivering effective presentations	**10**
Unit-V	**Excel** Introduction of Excel. File operations and Text operations, Concept of Workbook, Worksheet, Cell, Row, Column and Range, Copying and moving the content of a cell, Inserting cell / Row / Column, Deleting cell / Row / Column, Entering formula in a cell. Functions (Mathematical and Statistical Functions, Text Functions, Logical Functions).	**10**

Unit-VI	**Excel** Auto Sum, Cell Formatting, Fill handle, Auto Fill, Graph, Chart, Types of Charts, Auto Shape, Various types of Charts, adding data series. Data form, Auto Filter, Advanced Filter, Sort, Subtotal, Pivot Table, Data Validation, Goal Seek.	**10**
	Total:	**60**

Learning Outcome/Skills:

The students will be able to learn how to Integrate Word, Excel, and PowerPoint for comprehensive document creation and presentation, how to solve problems related to troubleshooting in worksheets, apply best practices for organizing, saving, and sharing files created in Word, Excel, and PowerPoint. They get to know a more thorough and detailed knowledge on word, Excel and Powerpoint.

nit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	10	15	1,2	NA
U2	10	15	1,2,3	NA
U3	10	15	1,2	NA
U4	10	15	1,2	NA
U5	10	20	1,2,3	NA
U6	10	20	1,2,3	NA
	60	100%		

List of Books

Sl. No.	Name of Author	Title of the Book
1	Michael Busby and Russell A. Stultz.	Office 2000
2	Bittu Kumar	Mastering Ms Office: Computer Skill Development - Be Future Ready
3	Cogent learning solution (dreamtech press)	Office 2013 in Simple Steps
4	Ramesh Bangia (Khanna Publications)	Learning Microsoft Office 2013

Subject: R Programming and Data Analytics   **Course Code: MIC301B**

Total Hours: 45 hours

Aim of the Course: The aim is to achieve knowledge of R Programming and how to apply it to real life business problems.
- The point of this course is to give you a vibe the fundamentals of R programming environment.
- You should have some idea of how to work with different data types, operators and conditional operators in R.
- You should have some idea of how to work with packages and libraries of R.
- You will learn to work with matrix, lists, vectors and strings of R.

Course Objective:

- To understand the Fundamentals of data types and operators.
- To understand concepts about conditional statements in R.
- To understand and implement String, List, Matrix, Vectors.
- To understanding about packages used for visualization in R.

Serial No.	Course Outcome	Mapped modules	PO
1	Remembering	M1, M2, M3, M4	PO1, PO2, PO3, PO4
2	Understanding the course	M1, M2, M3, M4	PO1, PO2, PO3, PO4
3	Applying the general problem	M1, M2, M3, M4	PO1, PO2, PO3

4	Analyze the problems	M1, M2, M3, M4	PO1, PO3, PO5
5	Evaluate the problems after analyzing	M1, M2, M3, M4	PO3, PO4, PO5
6	Create using the evaluation process	M1, M2, M3, M4	PO5, PO6

Module Number	Content	Total Hours	Percentage of questions	Bloom's Level
M1	**Introduction to Data Science and Analytics**	10	15%	L1, L2, L3
M2	**Basics of R Programming**	15	40%	L1, L2, L3
M3	**R-Function**	12	30%	L1, L2, L3, L4
M4	**Introduction to different packages of R**	8	15%	L1, L2, L3, L4, L5
Total		45	100%	

CO –PO Justification

CO	PO	Justification
1	PO1	Strongly mapped as students gain the knowledge on R syntax andsemantics and be fluent in the use of R flow control in writing theprograms.
	PO2	Moderately mapped as only few students identify their own problem byconducting literature review for writing programs.
	PO3	Strongly mapped as designing and implementation is required to write theprogram for the given problem statement.
	PO4	Moderately mapped as students apply the concepts learnt in continuing professional development and new developments.
2	PO1	Strongly mapped as students gain the knowledge on sequence, mapping and handling files and be fluent in the use of R flow control in writing thePrograms.
	PO2	Moderately mapped as only few students identify their own problem byconducting

		literature review for writing programs.
	PO3	Strongly mapped as designing and implementation is required to write theprogram for the given problem statement.
	PO4	Moderately mapped as students apply the concepts learnt in continuing professional development and new developments.
3	PO1	Strongly mapped as students gain the knowledge of Solving Algebra and be fluent in writing theprograms.
	PO2	Moderately mapped as only few students identify their own problem byconducting literature review for writing programs.
	PO3	Strongly mapped as designing and implementation is required to write theprogram for the given problem statement.
4	PO1	Strongly mapped as students gain the knowledge on working with visualizations and be fluent in writing thePrograms.
	PO3	Strongly mapped as designing and implementation is required to write theprogram for the given problem statement.
	PO5	Strongly mapped as students understand fundamentals of R syntax and semantics and fluent in the use of concepts in writing the programs to build application.
5	PO3	Strongly mapped as designing and implementation is required to write theprogram for the given problem statement.
	PO4	Moderately mapped as students apply the concepts learnt in continuing professional development and new developments.
	PO5	Strongly mapped as students understand fundamentals of R syntax and semantics and fluent in the use of concepts in writing the programs to build application.
6	PO5	Strongly mapped as students understand fundamentals of R syntax and semantics and fluent in the use of concepts in writing the programs to build application.
	PO6	Strongly mapped as students understand fundamentals of visualizations.

DETAILED SYLLABUS

Module	Name of the Topic	Hours
1	**Introduction to Data Science and Data Analytics:** Data: Types of data, scales of measurement. Univariate Data: Descriptive measures related to univariate metric data. Bivariate Data: Descriptive measures related to bivariate metric data. Correlations, linear and polynomial regressions. Descriptive measures related to bivariate categorical data: Measures of associations in a contingency table. Exploratory data analysis: Philosophy of EDA, Basic tools of EDA (plots, graphs and summary statistics). Data Visualization: Basic principles, ideas and tools for data visualization. Visualization of qualitative, quantitative, temporal, spatial and panel data. Introduction to Data Analysis Tools.	10L
2	**Basics of R Programming:** What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed.packages(), packageDescription(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and –inf. R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame – R - Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables - R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators - R Decision Making: if statement, if – else statement, if – else if statement, switch statement – R Loops: repeat loop, while loop, for loop - Loop control statement: break statement, next statement.	15L
3	**R-Function:** Function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with	12L

	argument values - R-Strings – Manipulating - R Vectors – Sequence vector, rep function, vector access, vector names, vector math, vector recycling, vector element sorting - R List - Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector - R Matrices – Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division- R Arrays: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements - R Factors –creating factors, generating factor levels gl().	
	String functions: grep(), nchar() , paste(), sprintf(), substr(), strsplit(), regex() gregexpr(), toupper(), tolower(), paste()	
4	**Introduction to different packages of R:** ggplot2, ggraph, dygraphs, MASS, tidyquant, dplyr.	**8L**

List of Books:

Nameof Author	TitleoftheBook	Nameof thePublisher
Jared P Lander	R for Everyone	Addison Wesley
Jeeva Jose	Beginners Guide for Data Analysis using R Programming | AICTE Recommended	Khanna Books
Sandip Rakshit	R Programming for Beginners	Mc Graw Hill
C Raju	Data Science: A Beginner's Guide	Penguin Business
V K Jain	Data Science and Analytics (with Python, R and SPSS Programming)	Khanna Books
Munish Trivedi	Data Science and Data Analytics Using Python	Khanna Books

Course: Basics of Operating System	
Course Code: MIC401A	Semester: IV
	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 4	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 4	Practical/Seasonal internal continuous evaluation: 0
	Practical/Seasonal external examination: 0

Sl. No.	Course Objective	
1	To understand key concepts of operating system.	
2	To understand various concepts of process and threads	
3	To understand various concepts of memory management	
4	To understand various concepts of storage management and file management	
5	To Understand various concepts of system security and data protection.	
	Course Outcomes	Mapped module/Unit
CO 1	Students should have a good understanding of the different concepts of operating	U1

	systems.	
CO 2	Students should have a good understanding of process , thread and process scheduling.	U2
CO 3	Students should have a good understanding of memory management and different memory management algorithms	U3
CO 4	Students should have a good understanding of secondary storage , algorithms of secondary storage and file system.	U4
CO5	Students should have a good understanding of different aspects of data security and protection	U5

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Learning Outcome/Skills:

The students will be able to learn, acquire and apply the fundamentals of operating system, type of operating system, process and thread, memory and algorithms, secondary storage management, file management and how data can be protected and secured in a system.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	12	20	1,2	NA
U2	12	20	1,2	NA
U3	12	20	1,2,3	NA
U4	12	20	1,2,3	NA
U5	12	20	1,2,3	NA
	60	100%		

Course Code:	MIC401A	
Course:	Basics of Operating System	Credits: 4.0
	Contents	

Chapter	Name of the Topic	Hours
Unit-I	**Introduction to Operating System** Definition of Operating System, Purpose , functions of an OS, Types of Operating Systems: Batch Operating System, Multi-Programming System, Multi-Tasking Operating System, Time-Sharing Operating System. Examples of Popular Operating Systems – Windows, Linux, MacOS	12
Unit-II	**Processes and Threads** Definition of a processes, Difference between program and a process, definition of a thread, Differences between process and thread, what is process scheduling, First-Come - First-Served (FCFS) Scheduling, Shortest-Job-Next (SJN) Scheduling Priority Scheduling, Shortest Remaining Time, Round Robin(RR) Scheduling	12
Unit-III	**Memory Management** What is primary memory , Physical and logical address space, Fixed partition allocation, variable partition allocation, paging, segmentation, swapping, demand paging, page fault, page replacement algorithms (FIFO, Optimal page replacement)	12
Unit-IV	**Storage Management and File Systems** Hard disk structure, Hard disk scheduling algorithm (FIFO, SSTF, SCAN, C-SCAN), RAID and its levels, How files are organized on disk, File access methods, Sequential file access, Direct access file	12

	Security and Protection Goals of data protection, Principles of data protection, program Threats, System and Network Threats, Cryptography as a security tool, implementing security Defenses, Firewalling to protect system and networks.	
Unit-V		**12**
	Total:	**60**

List of Books

Sl. No.	Title of the Book	Name of Author
1	"Operating System Concepts"	by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne.
2	"Modern Operating Systems"	by Andrew S. Tanenbaum and Herbert Bos.
3	Operating System Concepts	By Ekta Walia

Maulana Abul Kalam Azad University of Technology, WB
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Course: Database Management with SQL	
Course Code: MIC401B	**Semester: IV**
	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 4	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 4	Practical/Seasonal internal continuous evaluation: 0
	Practical/Seasonal external examination: 0

Sl. No.	Course Objective
1	To understand key concepts of database
2	To understand various data models of DBMS
3	To understand various aspects of RDBMS
4	To understand DDL using CREATE Command
5	To Understand DML using INSERT, DELETE and UPDATE command

6	To Understand SQL using SELECT command	
7	To understand different SQL functions.	
	Course Outcomes	**Mapped module/Unit**
CO 1	Student should have a good understanding of database concepts and Relational Database Management Systems.	U1
CO 2	Student should have a good understanding of how to Retrieve data in RDBMS using Structured Query Language	U2,U3
CO 3	Students should have a good understanding of how to manipulate data in RDBMS using Structured Query Language.	U4
CO 4	Students should have a good understanding of how to Design SQL queries using aggregate functions	U5

Learning Outcome/Skills:

The students will be able to learn, acquire and apply the fundamentals of database concepts and Relational Database Management Systems, retrieve data using SQL, manipulate data using SQL, Design SQL queries using aggregate functions. They get to know a more thorough and detailed knowledge on the RDBSM design and manipulation and application.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	12	20	1,2	NA
U2	12	20	1,2	NA
U3	12	20	1,2,3	NA
U4	12	20	1,2,3	NA
U5	12	20	1,2,3	NA
	60	100%		

Course Code:	MIC401B	
Course:	Database Management with SQL	Credits: 4.0
	Contents	
Chapter	**Name of the Topic**	**Hours**
Unit-I	**Introduction to Databases** Database Concepts: Introduction to database concepts and its need, Database Management System. Relational data model: Concept of domain, tuple, relation, candidate key, primary key, alternate key Advantages of using Structured Query Language, Data Definition Language, Data Query Language and Data Manipulation Language	**12**
Unit-II	**Database Design and Entity-Relationship (ER) Modelling** Database Administrator, Database Users, Data Abstraction, Three Schema architecture of DBMS E-R Model: Need for E-R Model, Various steps of database design, Mapping Constraints, E-R diagram, Subclass, Generalization, Specialization, Aggregation, Strong Entity-Weak Entity, Normalization process upto 3NF.	**12**
Unit-III	**SQL Fundamentals and Data Manipulation** Data Definition: CREATE DATABASE, CREATE TABLE, DROP, ALTER Data Query: SELECT, FROM, WHERE with relational operators, BETWEEN, logical operators, IS NULL, IS NOT NULL Data Manipulation: INSERT, DELETE,UPDATE.	**12**
Unit-IV	**SQL Functions** Math functions: POWER (), ROUND (), MOD (). Text functions: UCASE ()/UPPER (), LCASE ()/LOWER (), MID ()/SUBSTRING() /SUBSTR (), LENGTH (), LEFT (), RIGHT (), INSTR (), LTRIM (), RTRIM (), TRIM (). Date Functions: NOW (), DATE (), MONTH (), MONTHNAME (), YEAR (), DAY (), DAYNAME ().	**12**
Unit-V	**Aggregate Functions JOINS and SET operations.** Aggregate Functions: MAX (), MIN (), AVG (), SUM (), COUNT (); using COUNT (*). Querying and manipulating data using Group by, Having, Order by clauses Joining Tables : Unrestricted join, Restricted join, Using table Aliases, Equi join, Non equ-join, Natural join. Using JOIN clause of SQL SELECT. Performing set operations on Relations : UNION, MINUS operator, INTERSECT operator.	**12**
Total:		**60**

List of Books

Sl. No.	Name of Author	Title of the Book
1	Henry F. Korth and Silberschatz Abraham Mc.Graw Hill	Database System Concepts
2	Ramez Elmasri, Shamkant B.Navathe Addison Wesley	Fundamentals of Database Systems
3	Ivan Bayross BPB Publication	SQL, PL/SQL – The Programming Language of Oracle
4	R.P. Mahapatra, Govind Verma	Database Management System | AICTE Recommended

Course: PHP Programming & Web Development	
Course Code: MIC401C	Semester: IV
	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 4	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 4	Practical/Seasonal internal continuous evaluation: 0
	Practical/Seasonal external examination: 0

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Sl. No.	Course Objective
1	To understand key concepts of Web technology, types of websites and design considerations.
2	To understand various tags of HTML and create web pages using different HTML tags.
3	To understand various usages of CSS.
4	To understand what is PHP and the different control statements of PHP
5	To Understand the usage of different library functions of PHP.
6	To Understand using HTML form and to pass data from HTML to PHP file
7	To understand Mysql and to send and retrieve data from Mysql tables.

	Course Outcomes	Mapped module/Unit
CO 1	Student should have a good understanding of Web technology, types of websites and design considerations.	U1
CO 2	Student should have a good understanding of various tags of HTML and create web pages using different HTML tags and usages of CSS.	U2,U3
CO 3	Students should have a good understanding of PHP and the different control statements of PHP , different library functions of PHP.	U4
CO 4	Students should have a good understanding of using HTML form and to pass data from HTML to PHP file, Mysql and to send and retrieve data from Mysql tables.	U5

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Learning Outcome/Skills:

The students will be able to learn, acquire and apply the fundamentals of database concepts and Relational Database Management Systems, retrieve data using SQL, manipulate data using SQL, Design SQL queries using aggregate functions. They get to know a more thorough and detailed knowledge on the RDBSM design and manipulation and application.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	12	20	1,2	NA
U2	12	20	1,2	NA
U3	12	20	1,2,3	NA
U4	12	20	1,2,3	NA
U5	12	20	1,2,3	NA
	60	100%		

Course Code:	MIC401C	
Course:	PHP Programming & Web Development	Credits: 4.0
	Contents	
Chapter	Name of the Topic	Hours
Unit-I	**Introduction to Web Design:** Introduction of Internet, WWW, Website, Working of Websites, Web pages, Front End, Back End, Client and Server Scripting Languages, Responsive Web Designing, Types of Websites (Static and Dynamic Websites), representation of URL format, port number, Http and https protocol, Web Page Design Considerations and Principles, Search and Meta Search Engines, WWW, Browser, HTTP, Publishing Tools.	12
Unit-II	**HTML Basics** Introduction, Basic Structure of HTML, Head Section and Elements of Head Section, Formatting Tags: Bold, Italic, Underline, Strikethrough, Div, Pre Tag Anchor links and Named Anchors Image Tag, Paragraphs, Comments, Tables: Attributes –(Border, Cellpadding, Cell spacing , height , width), TR, TH, TD, Rowspan, Colspan Lists : Ordered List, Unordered List , Definition List, Forms, Form Elements, Input types, Input Attributes, Text Input Text Area, Dropdown, Radio buttons , Check boxes, Submit and Reset Buttons Frames: Frameset, nested Frames. HTML 5 Introduction, HTML5 New Elements: Section, Nav, Article, Aside, Audio Tag, Video Tag, HTML5 Form Validations: Require Attribute, Pattern Attribute, Autofocus Attribute, email, number type, date type , Range type, HTML embed multimedia, HTML Layout.	12

Unit-III	**Cascading Style Sheets :** Introduction to CSS, Types of CSS, CSS Selectors : Universal Selector ,ID selector, Tag Selector, Class Selector, Sub Selector, Attribute Selector, Group Selector, CSS Properties: Back Ground properties, Block Properties, Box properties, List properties, Border Properties, Positioning Properties, CSS Lists CSS Tables, CSS Menu Design CSS Image Gallery,	**12**
Unit-IV	**Introduction to PHP:** Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html. What is a function, Define a function, Call by value and Call by reference, Recursive function, String, Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function, Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function.	**12**
Unit-V	**Handling Html Form , Database Connectivity with MySql :** Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission, GET vs POST methods, Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Establishing a database connection Executing SQL queries, Fetching data from the database (using PHP functions).	**12**
	Total:	**60**

List of Books

Sl. No.	Name of Author	Title of the Book
1	The complete Reference HTML & CSS (5th Edition) McGraw Hill Education	Thomas. A.Powell
2	PHP: THE COMPLETE REFERENCE McGraw Hill Education	Steven Holzner
3	Ivan Bayross BPB Publication	SQL, PL/SQL – The Programming Language of Oracle
4	Khanna Publishing House	Mastering PHP

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Course: Graphic Design with Photoshop and Illustrator	
Course Code: MIC402A	Semester: IV
	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Lecture: 3	End semester Exam: 70
Tutorial: 1	Attendance: 5
Practical:	Continuous Assessment: 25
Credit: 4	Practical/Seasonal internal continuous evaluation:
	Practical/Seasonal external examination:

Sl. No.	Course Objective
1	Understand the basic principles and elements of graphic design including color.
2	Familiarize themselves with Adobe Photoshop and Illustrator interfaces.
3	Apply various tools and techniques in Photoshop and Illustrator to create and edit digital designs.
4	Design logos, brochures, posters, and other graphic materials.

	Course Outcomes	Mapped module/Unit
CO 1	Students will be introduced to the basics of graphic design.	U1, U2
CO 2	Students will hopefully acquire a deemed knowledge on the key areas of Adobe Photoshop and illustrator interfaces.	U1, U2, U3
CO 3	Students will learn about the different tools and techniques involved in graphic designing aesthetics.	U1, U2, U3
CO 4	Students will learn to design logos, posters, banners, web interface etc and their subsequent application.	U2, U3,U4

Learning Outcome/Skills:

This Subject aims to provide students with a comprehensive understanding of graphic design principles and the practical skills needed to create visually appealing designs using Adobe Photoshop and Illustrator. Through hands-on projects and exercises, students will develop proficiency in using these industry-standard software tools for various design applications.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	6	15	1, 2	NA
U2	8	30	1, 2, 3	NA
U3	7	25	1, 2, 3	NA
U4	9	30	1, 2, 3	NA
	30	100%		

Maulana Abul Kalam Azad University of Technology, WB
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Course Code:	MIC402A	
Course:	Graphic Design with Photoshop and Illustrator	Credits: 2.0
	Contents	
Chapter	Name of the Topic	Hours
Unit-I	**Introduction to Graphic Design** • What is Graphics Designing • Understanding design principles • Exploring design trends and styles • Introduction to Adobe Photoshop and Illustrator interfaces	6
Unit-II	**Understanding design principles: composition, balance, color, typography, etc.** • Principles of typography and type manipulation • Combining text and graphics • Creating visually appealing layouts and compositions • Understanding color modes and models • Working with color swatches and gradients • Creating harmonious color schemes • Using color effectively in design	8
Unit-III	**Working with Photoshop & Illustrator** **Different Photoshop Techniques** • Understanding raster vs. vector graphics • Image resolution and file formats • Selection tools and layers • Image manipulation and retouching techniques • Working with filters and effects • Creating digital illustrations and paintings • Applying layer styles and blending modes • Designing mock-ups and prototypes **Different Illustrator Techniques** • Understanding vector graphics and their advantages • Working with artboards and the Illustrator workspace • Basic shapes and drawing tools	7

	• Creating and editing paths	
	• Working with gradients and patterns	
	• Creating custom brushes and symbols	
	• Using the pen tool for precision drawing	
	• Designing logos and icons	
Unit-IV	**Final Project and Portfolio Development** • Applying design principles and skills to create a comprehensive project • Reviewing and refining design work • Developing a portfolio showcasing the student's best designs	**9**
	Total:	**30**

List of Books

Sl. No.	Name of Author	Title of the Book
1	Ellen Lupton and Jennifer Cole Phillips	Graphic Design: The New Basics"
2	Alex W. White	"The Elements of Graphic Design"
3	Josef Müller-Brockmann	"Grid Systems in Graphic Design: A Visual Communication Manual for Graphic Designers, Typographers and Three Dimensional Designers"
4	David Airey	"Logo Design Love: A Guide to Creating Iconic Brand Identities"
5	Robin Williams	"The Non-Designer's Design Book"
6	Andrew Faulkner and Conrad Chavez	"Adobe Photoshop CC Classroom in a Book (2021 release)"
7	Brian Wood	"Adobe Illustrator CC Classroom in a Book (2021 release)"
8	Scott Kelby	"The Adobe Photoshop CC Book for Digital Photographers"
9	Khanna Books	"Mastering Photoshop"
10	Brian Wood	"Adobe Illustrator CC Classroom in a Book (2021 release)"

Course: Unix and Shell programming	
Course Code: MIC402B	Semester: IV
	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 4	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 4	Practical/Seasonal internal continuous evaluation: 0
	Practical/Seasonal external examination: 0

Sl. No.	Course Objective
1	To understand key concepts of operating system.
2	To understand various concepts of process and threads
3	To understand various concepts of memory management
4	To understand various concepts of storage management and file management
5	To Understand various concepts of system security and data protection.

	Course Outcomes	**Mapped module/Unit**
CO 1	Student should have a good understanding of the different concepts of operating system.	U1
CO 2	Student should have a good understanding process, thread and process scheduling.	U2
CO 3	Students should have a good understanding of memory management and different memory management algorithms	U3
CO 4	Students should have a good understanding of secondary storage, algorithms of secondary storage and file system.	U4

CO5	Students should have a good understanding of different aspects of data security and protection	U5

Learning Outcome/Skills:

The students will be able to learn, acquire and apply the fundamentals of operating system, type of operating system, process and thread, memory and algorithms, secondary storage management, file management and how data can the protected and secured in a system.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	12	20	1,2	NA
U2	12	20	1,2	NA
U3	12	20	1,2,3	NA
U4	12	20	1,2,3	NA
U5	12	20	1,2,3	NA
	60	100%		

Course Code:	MIC402B	
Course:	Unix and Shell Programming	Credits: 4.0
	Contents	
Chapter	Name of the Topic	Hours
Unit-I	**Introduction to UNIX :** UNIX operating system, UNIX architecture: Kernel and Shell, Files and Processes, System calls, Features of UNIX, Internal and external commands, Calendar (cal), Display system date (date), Message display (echo), Calculator (bc), Knowing who are logged in (who), System information using uname, File name of terminal connected to the standard input (tty), Absolute pathname,	12

	Relative pathname, Significance of dot (.) and dotdot (..), Displaying pathname of the current directory (pwd), Changing the current directory (cd), Make directory (mkdir), Remove directories (rmdir), Listing contents of directory (ls), Very brief idea about important file systems of UNIX	
Unit-II	**File handling and Process :** Displaying and creating files (cat), Copying a file (cp), Deleting a file (rm), Renaming/ moving a file (mv), Paging output (more), Line, word and character counting (wc), Comparing files, Brief idea about effect of cp, rm and mv command on directory, Basic idea about UNIX process, Display process attributes (ps), Display System processes, Process creation cycle, Shell creation steps (init -> getty -> login -> shell), Process state, Zombie state, Background jobs	12
Unit-III	**File and directory handling and environment variables :** File and directory attributes listing and very brief idea about the attributes. Chmod, File system and inodes, Hard link, Soft link, Use of environment variables, Some common environment variables (HOME, PATH, LOGNAME, USER, TERM, PWD, PS1, PS2), Aliases, Brief idea of	12
Unit-IV	**Unix Filters :** Redirection, Standard input,	12

	Standard output, Standard error, /dev/null and /dev/tty, Pipe, tee, Filters Prepare file for printing (pr), Custom display of file using head and tail, Vertical division of file (cut), Paste files (paste), Sort file (sort), Finding repetition and nonrepetition (uniq), Manipulating characters using tr, Searching pattern using grep,	
Unit-V	**Introduction to shell script :** Simple shell scripts, Interactive shell script, Using command line arguments, Logical operator (&&, ‖), Condition checking (if, case), Expression evaluation (test, []), Computation (expr), Using expr for strings, Loop (while, for), Use of positional parameters	12
	Total:	60

List of Books

Sl. No.	Title of the Book	Name of Author
1	"Operating System Concepts"	by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne.
2	"Modern Operating Systems"	by Andrew S. Tanenbaum and Herbert Bos.
3	Operating System Concepts	Ekta Walia
4	Introduction to LINUX and SHELL SCRIPTING	K.R. Venugopal, M.T. Somasheara, G. Aamalorpavam

Course: Advanced Excel & Data Analytics	
Course Code: MIC402C	Semester: IV
	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 4	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit: 4	Practical/Seasonal internal continuous evaluation: 0
	Practical/Seasonal external examination: 0

Sl. No.	Course Objective
1	To understand key concepts of fundamental operations in Excel
2	To understand various concepts of working with excel functions
3	To understand various concepts of sorting, filtering, and reporting in excel.
4	To understand various concepts of creating and formatting charts in excel.
5	To Understand various concepts of data analytics tools in excel.

	Course Outcomes	Mapped module/Unit
CO 1	Student should have a good understanding of the fundamental operations in Excel.	U1
CO 2	Student should have a good understanding of how to work with excel functions.	U2
CO 3	Students should have a good understanding of how to sort, filter and report in excel.	U3
CO 4	Students should have a good understanding of how to create and format charts in excel.	U4
CO5	Students should have a good understanding of how to use data analytics tools in excel.	U5

Learning Outcome/Skills:

The students will be able to learn, acquire and apply the fundamentals working principles of Excel, work with different types of functions, operations such as sorting, filtering, reporting, charts and apply different tools for data analytics.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	12	20	1,2	NA
U2	12	20	1,2	NA
U3	12	20	1,2,3	NA
U4	12	20	1,2,3	NA
U5	12	20	1,2,3	NA
	60	100%		

Course Code:	MIC402C	
Course:	**Advanced Excel & Data Analytics**	Credits: 4.0

Contents		
Chapter	**Name of the Topic**	**Hours**
Unit-I	**Introduction of Excel :** File operations and Text operations, Concept of Workbook, Worksheet, Cell, Row, Column and Range, Copying and moving the content of a cell, Inserting cell / Row / Column, Deleting cell / Row / Column, Entering formula in a cell. Auto Sum, Cell Formatting, absolute and relative cell addressing.	12
Unit-II	**Working with Functions :** Conditional expressions with IF, Logical functions using AND, OR and NOT, using VLOOKUP, HLOOKUP, MATCH, INDEX, Nested VLOOKUP with Extra Match, VLOOKUP with Tables, Using VLOOKUP to consolidate Data from multiple sheets, Date and time functions, Text functions, statistical functions, Financial functions.	12
Unit-III	**Sorting , Filtering and working with Reports :** Sorting tables, using multiple level sorting, using custom sorting, filtering data for selected view (Auto filter), using advanced filter options, creating subtotals, multiple level subtotals.	12
Unit-IV	**Working with charts :** Creating different types of charts (line, pie, bar, column etc.), formatting charts, using 3D charts, using secondary axis in charts, exporting charts to word and power point.	12
Unit-V	**Working with data Analytics:** Goal seek, Data tables, Scenario manager, data validation, creating pivot tables, formatting and customizing pivot tables, viewing sub totals under pivot table, macros.	12
	Total:	**60**

List of Books

Sl. No.	Title of the Book	Name of Author
1	Excel 2019 all-in-one (bpb)	by Lokesh Lalwani
2	Mastering Excel & Formulae (khannabooks)	By WebTech Solutions
3	Data Analysis with Excel (bpb)	by Manish Nigam
4	Data Science and Data Analytics Using Python (khannabooks)	By Munesh Chandra Trivedi, Anil Kumar Dubey

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