SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

An Autonomous Institution
(As per UGC -2018 Regulations, Affiliated to Pondicherry University)

PUDUCHERRY – 605107

MASTER OF COMPUTER APPLICATIONS [MCA]

(REGULATIONS - 2020)

CURRICULUM AND SYLLABI

COLLEGE VISION AND MISSION

VISION

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

MISSION

M1: Quality Education: To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: **Research and Innovation:** To foster value-based research and innovation in collaboration with Industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship : To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: **Ethical Values:** To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

DEPARTMENT VISION AND MISSION

VISION

To excel in transforming the graduates to be proficient in Computer Applications that generates competent IT professionals, researchers and entrepreneurs globally.

MISSION

M1- Excellence in Education: To impart quality education by instilling confidence towards taking up various challenges in the ever growing Industrial sectors.

M2-**Research and Modernization:** To indoctrinate innovative research programs through enhancing technical competencies to balance the upgrading industrial and societal needs.

M3-**Placement and Entrepreneurship**: To be recognized as experts by creating extensive global opportunities in placements and cultivating entrepreneurship skills for effective dissemination of creative ideas in business ventures.

M4: Moral Ethics: To produce ethically strong professionals by infusing optimistic approach for the significant contribution to the society.

(Dr. A. Ramalingam)

PROGRAMME OUTCOMES (POs)

P01. Mathematical Computation knowledge: Apply the knowledge of mathematics, science, computing fundamentals to the solution of complex application oriented problems.

P02. Problem analysis: Identify, formulate, research literature, and analyze logical oriented problems to arrive at substantiated conclusions using first principles of mathematics and natural sciences.

P03. Design/development of solutions: Design, Develop and evaluate efficient software solutions for complex problems in various domain like Animation, Banking, Insurance, Healthcare, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and methodologies, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex computational activities with an understanding of the limitations.

PO6. The Social responsibilities: Understand and follow the responsibilities and consequences based on societal, environment, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional computational practice.

PO7. Environment and sustainability: Understand the impact of the professional Computing solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

PO8. Professional Ethics: Understand and Apply professional ethical principles and responsibilities, Cyber regulation and norms of the professional Computing practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.

PO10. Communication Efficiency: Communicate effectively with the computing society in both verbal and written form. Be able to comprehend and write effective report documentation, make effective presentations, and give and receive clear instructions.

PO11. Project Management and Finance: Demonstrate knowledge and understand computing and management principles and apply them in resource management and economics to provide better services in the field of Software development and manage projects in multidisciplinary environments.

PO12. Continuous Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1. Proficiency: To provide widespread knowledge in Computer Science, Computer Application and Applied mathematics.

PEO2. Brace: To formulate the students with basic and adequate knowledge in computer programming languages and software application development.

PEO3. Provide: To equip the student for the understanding of the society oriented projects, complexity in the technological subjects and empower them to do their higher studies.

PEO4. Bestow: To equip the students as professionals by providing opportunities to augment their problem solving ability, communication skills along with organizing facilities.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Formation of Mathematical and computer systems to apply mathematical and system concepts to resolve all kinds of problems using applicable mathematical analysis, programming concepts on various computing process.

PSO2: Development of Communication, information and technical concepts to train with sound knowledge to apply and strengthen informatics and technologies.

PSO3: Creation of Occupational, Scientific concepts to interpret and respond to professional dexterity with communication skills and carry out innovative designs in research.

Note: Bridge course has to be conducted to the students before admitting into the 1st semester MCA Programme.

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MCA CURRICULUM

BRIDGE COURSES			
Sl. No.	**Course Code**	**Course Title**	**Hours**
1	P20MCB001	Fundamentals of Computers	30
2	P20MCB002	Introduction to Problem Solving	30
3	P20MCB003	Introduction to Computer Programming	30
4	P20MCB004	Fundamentals of Computer Organization and Operating Systems	30

SEMESTER – I										
Sl. No.	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESE**	Total
Theory										
1	P20MCT101	Mathematical Foundation of Computer Applications	PC	3	1	-	4	25	75	100
2	P20MCT102	Object oriented Programming in C++	PC	3	-	-	3	25	75	100
3	P20MCT103	Advanced Data Base Management Systems	PC	3	-	-	3	25	75	100
4	P20MCT104	Accounting and Financial Management	PC	3	-	-	3	25	75	100
5	P20MCT105	Problem Solving Approach	PC	3	-	-	3	25	75	100
Practical										
6	P20MCP101	Object Oriented Programming Lab in C++	PC	-	-	4	2	50	50	100
7	P20MCP102	Advanced Data Base Management Systems Lab	PC	-	-	4	2	50	50	100
8	P20MCP103	Tally Lab	PC	-	-	4	2	50	50	100
Employability Enhancement Course										
9	P20MCC1XX	Certificate Course-I	EEC	-	-	4	-	100	-	100
10	P20MCS1XX	Skill Development Course-I	EEC	-	-	4	-	100	-	100
I Semester Total Credits/Marks							**22**	475	525	**1000**

SEMESTER – II										
Sl. No.	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESE**	**Total**
Theory										
1	P20MCT201	Advanced Data Structures and Algorithms	PC	3	1	-	4	25	75	100
2	P20MCT202	Advanced Computer Networks	PC	3	-	-	3	25	75	100
3	P20MCT203	JAVA Programming	PC	3	-	-	3	25	75	100

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4	P20MCT204	Web Application Development	PC	3	-	-	3	25	75	100
5	P20MCE2XX	**Professional Elective-1:** Web Services and Technologies	PE	3	-	-	3	25	75	100
Practical										
6	P20MCP201	Advanced Data Structures and Algorithms Lab	PC	-	-	4	2	50	50	100
7	P20MCP202	Java Programming Lab	PC	-	-	4	2	50	50	100
8	P20MCP203	Web Application Development Lab	PC	-	-	4	2	50	50	100
Employability Enhancement Course										
9	P20MCC2XX	Certificate Course-II	EEC	-	-	4	-	100	-	100
10	P20MCS201	Skill Development Course-II (NPTEL / MOOC / SWAYAM)	EEC	-	-	4	-	100	-	100
II Semester Total Credits/Marks							**22**	475	525	**1000**

SEMESTER – III										
Sl. No.	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESE**	**Total**
Theory										
1	P20MCT301	Machine Learning	PC	3	-	-	3	25	75	100
2	P20MCT302	Agile Software Development and Testing	PC	3	-	-	3	25	75	100
3	P20MCT303	C# and .Net	PC	3	-	-	3	25	75	100
4	P20MCT304	Mobile Application Development	PC	3	-	-	3	25	75	100
5	P20MCE3XX	**Professional Elective-2:** Big Data	PE	3	-	-	3	25	75	100
Practical										
6	P20MCP301	C# and .Net Lab	PC	-	-	4	2	50	50	100
7	P20MCP302	Mobile Application Development Lab	PC	-	-	4	2	50	50	100
8	P20MCP303	Mini Project	PC	-	2	4	3	50	50	100
Employability Enhancement Course										
9	P20MCC3XX	Certificate Course-III	EEC	-	-	4	-	100	-	100
III Semester Total Credits/Marks							**22**	375	525	**900**

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SEMESTER – IV										
Sl. No.	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESE**	**Total**
1	P20MCT401	Office Automation and Modern Tools	PC	3	-	-	3	25	75	100
2	P20MCE4XX	**Professional Elective-3:** Management Concepts for Computer Applications	PE	3	-	-	3	25	75	100
Project Work										
3	P20MCP401	Office Automation Tools Lab	PC	-	-	4	2	50	50	100
4	P20MCP402	Technical Seminar and Report Writing	PC	-	-	4	2	100	-	100
5	P20MCW403	Project Work and Viva-Voce	PW	-	-	-	12	250	250	500
Employability Enhancement Course										
6	P20MCC4XX	Certificate Course-IV	EEC	-	-	4	-	100	-	100
IV Semester Total Credits/Marks							**22**	550	450	**1000**

SEMESTER WISE CREDIT DISTRIBUTION

Semester	I	II	III	IV	**Total Credits**
Credits	**22**	**22**	**22**	**22**	**88**

EEC courses are not included for CGPA calculation

Total number of credits required to complete Master of Computer Applications: 88 credits

ANNEXURE-I

PROFESSIONAL ELECTIVE COURSES

Sl. No.	**Course Code**	**Course Title**
Professional Elective-1 : Web Services and Technologies (Offered in Semester II)		
1	P20MCE201	REST API
2	P20MCE202	Web Technology and Its Applications
3	P20MCE203	Web Services
4	P20MCE204	XML and Applications
5	P20MCE205	Service Oriented Architecture

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Professional Elective-2: Big Data (Offered in Semester III)		
6	P20MCE301	Data Science in Big Data
7	P20MCE302	Big Data Analytics and Applications
8	P20MCE303	Artificial Intelligence and Deep Learning
9	P20MCE304	Cloud Computing and Big Data
10	P20MCE305	Big Data tools and Techniques
Professional Elective-3: Management Concepts for Computer Applications (Offered in Semester IV)		
11	P20MCE401	Organizational Behaviour
12	P20MCE402	E-Business and Digital Marketing
13	P20MCE403	Management Concepts and Strategies
14	P20MCE404	Software Project Management and Quality Assurance
15	P20MCE405	Business Ethics and Corporate Social Responsibility

ANNEXURE – II
EMPLOYABILITY ENHANCEMENT COURSES

Sl. No.	Course Code	Course Title
1	P20MCCX01	Advanced Java Programming
2	P20MCCX02	Advanced Python Programming
3	P20MCCX03	Android Programming
4	P20MCCX04	Artificial Intelligence And Edge Computing
5	P20MCCX05	Azure DevOps
6	P20MCCX06	Block Chain
7	P20MCCX07	CCNA (Routing And Switching)
8	P20MCCX08	CCNA (Wireless)
9	P20MCCX09	Cloud Computing
10	P20XXCX10	Cyber Security
11	P20MCCX11	Internet of Things
12	P20MCCX12	Python Programming
13	P20MCCX13	Software Testing
14	P20MCCX14	Web Programming –I
15	P20MCCX15	Web Programming-II

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Sl. No.	Course Code	Course Title
Skill Development Course-I:		
1.	P20MCS101	1.Communication Skills Lab
		2.Foreign Language/ IELTS-1
		3.Exploring Photoshop

**** Any one course to be selected from the list***

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BRIDGE COURSES

P20MCB001	FUNDAMENTALS OF COMPUTERS	L	T	P	C	Hrs
		0	30	0	0	30

Course Objectives

- To get familiar with the fundamental concepts of Computers.
- To learn fundamentals of Computer network.
- To study benefit and basic of DBMS.

Course Outcomes

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

CO1- Understand the basic knowledge on computer.

CO2- Understand the basic concepts of Database.

CO3- Learn the fundamentals of Networks.

UNIT- I INTRODUCTION TO COMPUTERS

History of Computers – Block diagram of a Computer – Components of a Computer system –Classification of computers - Hardware – Software – Categories of Software – Operating System – Applications of Computers – Network structure – Internet and its services – Intranet – Study of word processor – Preparation of worksheets.

UNIT-II INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS:

Data base Architecture - ACID properties-Data models -ER model-database schema-normalization-types of normalizations, Transaction Management, SQL:DDL,DML,DCL,TCL.

UNIT- III FUNDAMENTALS OF COMPUTER NETWORKS

Introduction to Network- Network topology-OSI layer-protocol-Transmission media -Network Device-IP address-port, sockets-TCP, UDP, DNS.

Text Books

1. V. Rajaraman, Neeharika Adabala : Fundamentals of computers, Prentice Hall India Learning Private Limited; 6th Revised Edition, 2014.
2. Silberschatz, Korth, Sudarshan, Database System Concepts , 4th Edition McGraw-Hill Higher Education, International Edition, 2002.
3. Andrews S. Tanenbaum, Computer Networks , Prentice Hall of India Private Limited, (4th Edition), 2003.

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P20MCB002	` INTRODUCTION TO PROBLEM SOLVING	L	T	P	C	Hrs
		0	30	0	0	30

Course Objectives

- To get familiar with various problem solving techniques.
- To impart the basic concepts of data structures and its terminologies.
- To understand concepts about stack and queue operations.
- To understand basic concepts about linked list and its various operations.

Course Outcomes

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

CO1 – State the fundamentals of data structures and complexity analysis.

CO2 – Relate the operations involved in stack, queue and linked list.

CO3 – Categorize the different sorting searching and merging algorithms.

UNIT-I INTRODUCTION TO PROBLEM SOLVING

Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code - Top-down design – program verification – – Algorithms: Definition, Pseudocode Representation – Time complexity and space complexity - efficiency & analysis of algorithms.

UNIT -II DATA STRUCTURES: BASIC TERMINOLOGIES

Arrays: one dimensional & multidimensional array – Searching: Linear, Binary Sorting: General sort, Bubble sort, Insertion sort - Merging.

UNIT -III INTRODUCTION TO STACK AND QUEUE

Stacks: Representation - Operations – Applications. Queues: Representation – Operations – Applications. Linked List: Single Linked List, Double Linked List, Circular Linked List.

Text Books

1. R. G. Dromey, How to Solve it by Computer, Pearson Education India; 1st Edition, 2006.
2. Ellis Horowitz, SartajSahni," Fundamentals of Data Structures", Illustrated Edition, Computer Science Press, 2018.
3. Thomas H. Coreman, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", PHI, Third Edition, 2010.

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P20MCB003	` INTRODUCTION TO COMPUTER PROGRAMMING	L	T	P	C	Hrs
		0	30	0	0	30

Course Objectives

- Students will gain a thorough understanding of the fundamentals of C programming
- Students will be able to code, compile and test C programs.
- Students be able to take up Application oriented C programming.

Course Outcomes

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

CO1- Exhibit the various types of control flow in C language

CO2- Illustrate the effective usage of arrays, Strings and functions in C.

CO3- Demonstrate the implementation of structures pointers and file access methods.

UNIT - I INTRODUCTION TO PROGRAMMING PARADIGMS

Structure of C program - C programming: Data, Data name, Data Types – Storage classes - Constants - Keywords – Operators - Expressions - Input/output statements – Decision making statements - Switch statement - Looping statement.

UNIT - II INTRODUCTION TO ARRAYS, STRINGS AND FUNCTION:

Declaration, Initialization – One dimensional array – Two dimensional arrays – String operations: length, compare, concatenate and copy – Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursive function.

UNIT – III USER DEFINED DATA TYPES AND FILES

Structure - Nested structures – Array of structures – typedef, Union, Pointer – Files – Create, Open, Close, and Processing of file content.

Text Books

1. E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill Publishing, Eighth Edition, 2019.

2. Reema Thareja, Programming in C, Oxford University Press, Second Edition, 2016.

3. Kernighan, B.W and Ritchie, D.M., The C Programming Language, Pearson Education, Second Edition, 2006.

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P20MCB004	FUNDAMENTALS OF COMPUTER ORGANIZATION AND OPERATING SYSTEMS	L	T	P	C	Hrs
		0	30	0	0	30

Course Objectives

- To get familiar with the fundamental concepts of Computer Organization.
- To learn the fundamentals of Computer Architecture.
- To study the fundamentals of Operating Systems.

Course Outcomes

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

CO1- Gain basic knowledge on Computer Organization.

CO2- Understand the basic concepts of Computer Architecture.

CO3- Learn the fundamentals of Operating Systems.

UNIT I

Basic Structures of Computer organization: Functional Units- Multiprocessors and Multicomputer- Memory Locations and Addresses- Memory operations- Instructions and Instruction Sequencing- Addressing modes- Assembly Language- Basic Input/output operations- Stacks and Queues- Subroutines- Shift and rotate Instructions- Byte-Sorting program.

UNIT II

Memory Organization and Processor Architecture: Memory hierarchy – main memory – auxiliary memory – Associate memory – Cache memory – Virtual memory. I/O organization-Advanced processor Architecture.

UNIT III:

Operating Systems: Introduction- Mainframe Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems - Real Time Systems – Hardware Protection – System Components – Handheld Systems - Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.
Threads: Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem– Semaphores

TEXT BOOKS

1. M. Morris Mano, “Computer System Architecture”, Prentice-Hall of India, Pvt. Ltd., Third edition, 2007.
2. V.Rajaraman and T. Radhakrishnan, “Computer Organization and Architecture”, 4th Edition, PHI Learning Pvt. Ltd., 2011.
3. William Stallings “Computer Organization and Architecture”, Prentice-Hall of India, Pvt. Ltd., Seventh edition, 2005.
4. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, fifth edition, Tata McGraw Hill Education, 2011.
5. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, John Wiley & Sons (ASIA) Pvt. Ltd, Seventh edition, 2005.
6. Harvey M. Deitel, Paul J. Deitel, and David R. Choffnes, “Operating Systems”, Prentice Hall, Third edition, 2003

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SYLLABUS

SEMESTER - I

P20MCT101	`MATHEMATICAL FOUNDATION OF COMPUTER APPLICATIONS	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

The primary objective of this course is to

- Provide mathematical background and sufficient experience
- To understand various topics of discrete mathematics like matrix algebra, logic and proofs, combinatorial, graphs, algebraic structures, formal languages and finite state automata.
- To extend student's Logical and Mathematical maturity and ability to deal with abstraction
- To introduce most of the basic terminology used in computer science courses
- To introduce the application of ideas to solve practical problems.

Course Outcomes

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

CO1 - Basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems. **(K2)**

CO2 - Logical operations and predicate calculus needed for computing skill. **(K3)**

CO3 - Design and solves Boolean functions for defining problems. **(K3)**

CO4 - Apply the acquired knowledge of formal languages to the engineering areas like Compiler Design. **(K4)**

CO5 - Apply the acquired knowledge of finite automata theory and to design discrete problems to solve by Computers. **(K3)**

UNIT I MATRIX ALGEBRA (12 Hrs)

Matrices - Rank of a matrix - Solving system of equations – Eigenvalues and Eigenvectors - Cayley - Hamilton theorem - Inverse of a matrix.

UNIT II BASIC SET THEORY (12 Hrs)

Basic definitions - Venn diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion – Partitions - Permutation and combination – Relations - Properties of relations - Matrices of relations - Closure operations on relations - Functions - Injective, subjective and objective functions.

UNIT III MATHEMATICAL LOGIC (12Hrs)

Propositions and logical operators - Truth table - Propositions generated by a set - Equivalence and implication - Basic laws - Some more connectives - Functionally complete set of connectives - Normal forms - Proofs in propositional calculus - Predicate calculus.

UNIT IV FORMAL LANGUAGES (12 Hrs)

Languages and grammars - Phrase structure, grammar - Classification of grammars -Pumping lemma for regular languages - Context free languages.

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UNIT V FINITE STATE AUTOMATA **(12 Hrs)**

Finite state automata - Deterministic finite state automata (DFA) - Nondeterministic finite state automata (NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages.

Text Books

1. David Makinson, “Sets, Logic and Maths for Computing”, Springer Indian Reprint, 2011.
2. Grimaldi, R.P and Ramana, B.V. "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2006.
3. Hopcroft J.E and Ullman,J.D, “Introduction to Automata Theory, Languages and Computation”, Narosa Publishing House, Delhi, 2002.

References

1. Kenneth H. Rosen, “Discrete Mathematics and Its Applications”, Tata McGraw Hill, 4th Edition, 2002.
2. Sengadir, T. “Discrete Mathematics and Combinatorics" Pearson Education, New Delhi, 2009.
3. Trembley, J.P. And Manohar, R, "Discrete Mathematical Structures with Applications to Computer Science", 2017.
4. Tata McGraw Hill, New Delhi, 2007.
5. Venkataraman, M.K., “Engineering Mathematics”, 2nd Edition, Volume-II, National Publishing Company, 1989.

Web References

1. https://sites.math.northwestern.edu/~mlerma/courses/cs310-05s/
2. https://csd.cs.cmu.edu/course-profiles/15-151-Mathematical-Foundations-for-Computer-Science
3. https://www.coursera.org/learn/mathematics-for-computer-science

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO3	3	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO5	3	3	2	1	-	-	-	-	-	-	-	-	1	-	-

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P20MCT102	OBJECT ORIENTED PROGRAMMING IN C++	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- Define Encapsulation, Inheritance and Polymorphism.
- Solve the problem with an object oriented approach.
- Analyze the problem statement and build object oriented system model.
- Describe the characters and behavior of the objects that comprise a system.
- Explain function overloading, operator overloading and virtual functions.

Course Outcomes

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

CO1 - Learn programming from real world examples. **(K1)**

CO2 - Understand Object oriented approach to finding Solutions. **(K2)**

CO3 - Create computer based solutions to various real-world problems using C++. **(K3)**

CO4 - Learn various concepts of object oriented approach towards problem solving. **(K2)**

CO5 - Develop the applications using object oriented programming with C++. **(K3)**

UNIT I INTRODUCTION TO C++ (9 Hrs)

Basic components of a C++ - Program and program structure - Compiling and Executing C++ Program - Data types - Expression and control statements Iteration statements in C++ - Introduction to Arrays - Multidimensional Arrays - Strings and String related Library Functions - Functions - Passing Data to Functions - Scope and Visibility of variables in Function.

UNIT II PRINCIPLES OF OBJECT ORIENTED PROGRAMMING (9 Hrs)

Basic Concepts of Object-Oriented Programming: Benefits of OOP – Object Oriented Languages – Applications of OOP. Class objects - data members - member functions –Access Spcifiers- this Pointer - Friends - Friend Functions - Friend Classes - Friend Scope - Static Functions - Constructors and Destructors - Static variables and Functions in class - Operator Overloading in C++ - Overloading Unary Operators - Overloading binary operators.

UNIT III INHERITANCE (9 Hrs)

Inheritance in C++ - Types of Inheritance - Pointers - Objects and Pointers - Multiple Inheritance. Virtual Functions - Polymorphism - Abstract classes. Real time examples in OOPS.

UNIT IV FILES AND STREAMS (9 Hrs)

Exception Handling: Exception – Basics – Exception Handling Mechanism – Throwing Mechanism – Catching Mechanism – Rethrowing Exception. Standard input and output operations: C++ iostream hierarchy - Standard Input/output Stream Library - Organizational Elements of the iostream Library - Programming using Streams - Basic Stream Concepts. File input and output: Reading a File - Managing I/O Streams - Opening a File –

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Different Methods - Checking for Failure with File Commands - Checking the I/O Status Flags - Dealing with Binary Files - Useful Functions.

UNIT V TEMPLATES AND STL **(9 Hrs)**

Class templates: Implementing a class template - Implementing class template member functions - Using a class template - Function templates - Implementing function templates - Using template functions - Template instantiation - Class template specialization - Template class partial specialization - Template function specialization - Template parameters - Static members and variables - Templates and friends - Templates and multiple-file projects. Standard Template library: Containers - iterators and application of container classes.

Textbooks

1. E. Balagurusamy, “Object Oriented Programming with C++”, McGraw Hill, 7th Edition, 2018.
2. Herbert Schildt, “C++ - The Complete Reference”, McGraw Hill Education, 4th Edition, 2017.

Reference Books

1. Herbert Schildt, “C++ - From the Ground Up”, McGraw Hill Education, 2nd edition,2010.Thomas L. Floyd, “Electronic Devices”, Nineth edition, Pearson Education, 2012.
2. Stanley B. Lippman, Stanley Lippman, Barbara Moo, “C++ Primer”, Addison-Wesley Professiona, 5th edition 2012.

Web Resources

1. https://www.tutorialspoint.com/cplusplus/index.htm
2. http://www.cplusplus.com/doc/tutorial/
3. https://www.w3schools.com/cpp/
4. https://www.javatpoint.com/cpp-tutorial
5. https://www.geeksforgeeks.org/cpp-tutorial/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	-	-	-	-	2	1	-	2	2	3	3
CO2	2	3	3	2	-	-	-	-	2	1	-	2	2	2	2
CO3	2	3	3	2	-	-	-	-	2	1	-	2	3	3	3
CO4	2	3	3	2	1	-	-	-	2	1	-	2	2	2	3
CO5	2	3	3	2	1	-	-	-	2	1	-	2	2	3	2

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P20MCT103	ADVANCED DATA BASE MANAGEMENT SYSTEMS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To learn about Database Structure and Data Models.
- To study SQL Commands for storing and retrieving data into the database.
- To study the Relational database system design
- To understand the concept of Transactions
- To understand the concept of Concurrency Control and Recovery System

Course Outcomes

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

CO1 - Create conceptual data model using Entity Relationship Diagram. **(K2)**

CO2 - Design conceptual and logical database models for an application. **(K1)**

CO3 - Normalize relational database design of an application. **(K2)**

CO4 - Explain the need for Indexing, Hashing and Transactions in the database. **(K3)**

CO5 - Understand the strategies for providing security, privacy, and recovery of data. **(K2)**

UNIT I INTRODUCTION (9 Hrs)

Database System Application, Purpose of Database Systems, View of Data, Database Languages, Relational Database, Database Design, System Structure, Database Architecture. Database Design and E-R Model: Overview of the Design Process, E-R Model, Constraints, E-R Diagrams, E-R Design Issues, Extended E-R features, Reduction to Relational Schemas, Other aspects of Database Design.

UNIT II RELATIONAL MODEL (9 Hrs)

Structure of Relational Database, Fundamental Relational Algebra Operations, Extended Relational Algebra Operations, Modification of the Database. Structured Query Language: Introduction, Basic Structure of SQL Queries, Set Operations, Additional Basic Operations, Aggregate Functions, Null Values, Nested Sub queries, Views, Join Expression.

UNIT III RELATIONAL DATABASE DESIGN (9 Hrs)

Features of Good Relational Designs, 1NF, 2NF, 3NF and 4NF with Examples. Atomic Domains and first Normal form, Decomposition using Functional Dependencies, Functional Dependency Theory, Algorithm for Decomposition, Decomposition using Multivalued Dependencies.

UNIT IV INDEXING, HASHING AND TRANSACTION MANAGEMENT (9 Hrs)

Basic Concepts, Ordered Indices, B+ Tree Index Files, B-Tree Files, Multiples – Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing , Bitmap Indices. Transaction Management: Transaction concept, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation and Atomicity, Serializability, Recoverability, Transaction Isolation Levels, Implementation of Isolation Levels.

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UNIT V QUERY PROCESSING AND CONCURRENCY CONTROL (9 Hrs)

Query Processing: Measures of Query Cost- Selection Operation- Sorting-Join Operation- Other Operations-Evaluation of Expressions.Query optimization: Overview -Transformation of Relational Expressions-Estimating Statistics of Expression Results- Choice of Evaluation PlanConcurrency Control: Lock Based Protocols, Timestamp Based Protocols -Validation Based Protocols.Recovery System: Failure Classification, Remote Backup Systems.

Text Books

1. Abraham Silberschatz, Henry F Korth, S Sudharshan, Database System Concepts 7th Edition, McGraw-Hill International Edition, 2019.
2. RamezElmasri and ShamkantNavathe, Durvasula V L N Somayajulu, Shyam K Gupta, “Fundamentals of Database Systems”, Pearson Education, United States of America, 2018.

Reference Books

1. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System, 8th Edition, Pearson Education-2006.
2. Raghu Ramakrishna, Johannes Gehrke, Database Management Systems, 3rd Edition, McGraw Hill, 2014.
3. RamezElmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 7th Edition, Pearson Education, 2016.

Web Resources

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. http://dev.mysql.com/doc/
3. http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	-	-	-	-	-	1	-	2	2	3	3
CO2	2	3	3	2	-	-	-	-	-	1	-	2	2	2	2
CO3	2	3	3	2	-	-	-	-	-	1	-	2	3	3	3
CO4	2	3	3	2	-	-	-	-	-	1	-	2	2	2	3
CO5	2	3	3	2	-	-	-	-	-	1	-	2	2	3	2

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P20MCT104	ACCOUNTING AND FINANCIAL MANAGEMENT	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To develop a deeper understanding of the fundamentals of Accounting and Financial Statements
- To learn how to apply mathematical principles in Finance and the concepts of Risk and Return
- To understand the need and procedure for conducting Financial Analysis for better decision-making
- To be familiar with the modes of generating funds for business and their implications
- To understand the ways to determine the deployment of funds in the business

Course Outcomes

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

CO1: Understand the fundamentals of accounting and the significance of Financial Statements **(K2)**
CO2: Demonstrate knowledge and understanding of the applications of mathematics in finance **(K3)**
CO3: Conduct Financial Analysis and use the outcome in making informed decisions in investing **(K4)**
CO4: Appreciate various sources of procurement of funds in business and their critical evaluation **(K3)**
CO5: Know how to determine the investing in long-term and short-term assets in business **(K3)**

UNIT I: UNDERSTANDING THE FUNDAMENTALS (9 Hrs)

Accounting - Meaning – Objectives- Branches of Accounting: Financial, Cost and Management Accounting. Accounting Concepts - Types of Accounts- Asset and Liability - Types - Accounting equation. Understanding Basic Accounting Records– Journal – Ledger – Trial Balance – Basics of Final accounts preparations - Income statement and Balance Sheet

UNIT II: MATHEMATICS OF FINANCE (9 Hrs)

Meaning of Finance –Financial Planning and Decisions - Time Value of Money – Principles of Compounding and Discounting – Computation of Present Value and Future Value for single, annuity and uneven cash flow. Concept of Risk and Return –Trade-off – Concepts of Debt and Equity – Need for Equity in Business – Pros and Cons of Debt Capital – Concept of Tax Benefit in Debt – Concept of Inflation – Significance of factoring Inflation in Financial Decisions.

UNIT III: FINANCIAL ANALYSIS (9 Hrs)

Financial Analysis - Meaning and Objectives – Annual Report As an Input for Analysis - Types of Financial Analysis – Horizontal Analysis – Vertical Analysis – Trend Analysis – Ratio Analysis - Significance of Ratio Analysis in Decision-making – Computation of Key Ratios - Liquidity Ratios – Profitability Ratios – Activity ratio and Financial ratios.

UNIT IV: FUNDS PROCUREMENT (9 Hrs)

Meaning of Funds – Sources of Funds – Long-Term Sources – Short-Term Sources – Spontaneous sources - Capital Structure – Need and Importance of Capital Structure – Determining Optimum Capital Structure – Concept and Computation of Earnings Before Interest and Tax (EBIT), Earnings Before Tax (EBT), and Earnings After Tax (EAT) - Leverage in Finance – Types and computation of Leverages – Operating Leverage, Financial Leverage, and Combined Leverage (Simple problems).

UNIT V: FUNDS DEPLOYMENT (9 Hrs)

Investment Decisions – Types - Long term investment decisions- Pay-Back Period Method, Net Present Value Method and Benefit-Cost Ratio Method. Short-Term Investment Decisions –Working Capital – Need and Importance of Working Capital– Determinants of Working Capital– Working Capital Financing. Components of Working Capital – Cash, Receivables and Inventory. Dividends: Concept and Meaning – Implications of Dividend Decisions on Liquidity Management – Investing the Surplus: Principles and Methods.

Text Books

1. S. Jayapandian, Accounting for Managers – Effective Techniques for Decision-making, Ane Books (3rd revised edition)
2. R. Narayanaswamy, Financial Accounting – A managerial perspective, PHI Learning, New Delhi. (2015 or later edition)
3. C. Paramasivan and T. Subramanian. Financial Management. New Age International, New Delhi. (2015 or later edition)

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Reference Books

1. S.N. Maheswari, Sharad K. Maheswari & Suneel K. Maheswari. Accounting For Management. Vikas Publishing (2017 or later edition)
2. Varun Dawar & Narendar L. Ahuja. Financial Accounting and Analysis. Taxmann Publications. (2018 or later edition)
3. Athma. P. Financial Accounting and Analysis. Himalaya Publishing House. (2017 or later edtion)
4. M.Y. Khan and P.K. Jain. Financial Management. Tata-McGraw Hill Publishers, New Delhi. (2019 or later edition)
5. I.M. Pandey. Financial Management. Vikas Publishing House, New Delhi. (2015 or later edition)
6. Prasanna Chandra. Financial Management. Tata-McGraw Hill Publishers, New Delhi. (2019 or later edition)
7. S.C. Kuchhal. Financial Management. Chaitanya Publishing House, Allahabad. (2014 or later edition)

Web Resources

1. http://www.annualreports.com/
2. http://www.mmachennai.org/
3. https://icmai.in/icmai/
4. https://nptel.ac.in/courses/110/107/110107144/
5. https://web.utk.edu/~jwachowi/wacho_world.html
6. https://www.icai.org/indexbkp.html
7. https://www.icsi.edu/home/
8. https://www.investopedia.com/
9. https://www.moneycontrol.com/
10. https://www.rbi.org.in/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	3	-	-	1	2	1	2
CO2	3	2	2	1	-	1	1	3	1
CO3	3	2	-	-	-	2	1	2	1
CO4	1	2	-	3	-	-	3	3	-
CO5	3	2	1	-	-	2	2	2	3

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P20MCT105	PROBLEM SOLVING APPROACH	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To identify the key concepts of computational thinking and problem solving.
- To know the basics of algorithm and data organization.
- To understand the fundamental algorithms and factoring methods.
- To know the basic concepts of array and problem solving techniques.
- To familiarize the concepts of text processing, pattern searching and recursive algorithms.

Course Outcomes

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

CO1 - Explain the basic concepts of computational thinking and problem solving. **(K1)**

CO2 - Explain basic concepts of algorithm and data organization. **(K2)**

CO3 - Develop algorithmic solution to problem solving. **(K3)**

CO4 - Describe the concepts of arrays, merging, sorting & searching. **(K3)**

CO5 - Implement a recursive algorithm to solve problems. **(K3)**

UNIT I INTRODUCTION **(9 Hrs)**

Computational Thinking - Information and Data - Converting Information into Data -Data Capacity - Data Types & Encoding - Logic-Solving Problems- Limits of Computation- Pseudocode& Flow Chart.

UNIT II ALGORITHMIC THINKING & DATA ORGANIZATION **(9 Hrs)**

Algorithmic Thinking: Algorithms – Software and Programming Languages – Act ions. Data Organization: Name list, Graph Hierarchies - Spread Sheets -Text processing – Patterns- Solutions in Pseudocode& Flow Chart.

UNIT III FUNDAMENTAL ALGORITHMS & FACTORING METHODS **(9 Hrs)**

Fundamental Algorithms: Exchanging - Counting – Summing - Factorial Computation – Fibonacci sequence - Reversing the Digit-Base Conversion - Character to number conversion. Factoring Methods: Finding Square Root - Greatest Common Divisor - Prime Number - Prime Factor - Pseudo Random Number - Raising to Large Power - Computing nth Fibonacci number- Solutions in Pseudocode& Flow Chart.

UNIT IV ARRAY, MERGING, SORTING AND SEARCHING **(9 Hrs)**

Array Techniques: Introduction - Array order reversal - Array Counting or Histogramming – Maximum and Minimum of a Set - Removal of Duplicate – Partitioning - Longest monotone. Merging sorting and searching: Two Way Merge - Sorting by Selection, Insertion, Exchanging, Diminishing, Increment, Partitioning. Searching: Binary – Hashing- Solutions in Pseudocode& Flow Chart.

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UNIT V TEXT PROCESSING, PATTERN SEARCHING & RECURSIVE ALGORITHM (9 Hrs)

Key word Searching - Text Line Adjustment - Linear Pattern Search - Sub Linear Pattern Search. Recursion: Binary Tree Traversal - Recursive Quick Sort - Towers of Hanoi - Sample Generation -Combination Generation - Permutation Generation- Solutions in Pseudocode& Flow Chart.

Text Books

1. David Riley and Kenny Hunt, “Computational Thinking for Modern Problem Solver”, Chapman & Hall / CRC Textbooks in Computing, 2014
2. R. G.Dromey, “How to solve it by Computer”, PHI, 2008.
3. Vickers Paul, “How to Think like a Programmer: Problem Solving for the Bewildered”,Cengage Learning EMEA, 2008.

Reference Books

1. V. Anton Spraul, “Think Like a Programmer: An Introduction to Creative Problem Solving”,Cengage Learning EMEA, 2012.
2. Harold Abelson & Gerald Jay Sussman, “Structure and Interpretation of Computer Programs”, McGraw-Hill Book Company New York, 1997.

Web Resources

1. https://www.edx.org/learn/problem-solving
2. https://www.lynda.com/Business-Skills-tutorials/Problem-Solving-Techniques/553700-2.html
3. https://www.classcentral.com/course/problem-solving-skills-6687

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	1	-	2	1	-	2	2	3	2
CO2	3	3	2	3	3	2	1	-	2	1	-	3	3	3	2
CO3	3	2	2	3	2	2	2	-	2	1	-	3	3	2	3
CO4	3	3	2	3	3	2	2	-	2	1	-	3	3	3	3
CO5	3	3	3	3	2	2	2	-	2	1	-	3	3	3	3

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P20MCP101	OBJECT ORIENTED PROGRAMMING LAB IN C++	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives

- To introduce the concepts of Basic Object Oriented concepts and Programming Basics.
- To gain insight into the Functions and Array usages using C++.
- To understand in depth about the Classes and Objects.
- To study the Operator overloading and Inheritance concepts.
- To acquaint the Files and Exception Handling concepts.

Course Outcomes

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

CO1 – Understand the Object Oriented concepts.

CO2 – Understand the Functions and Arrays.

CO3 – Construct the Classes and Objects.

CO4 – Explain the Operator overloading and Inheritance concepts.

CO5 – Describe Files and Exception Handling Methods.

LIST OF EXERCISES

Write C++ Programs for the followings:

1. Control Structures and Looping Structures.
2. Array Usages.
3. Class Declarations, Definition, and Accessing ClassMembers.
4. Constructor, parameterized constructor and copyconstructors.
5. Friend Function and FriendClass.
6. FunctionOverloading and Constructor Overloading.
7. Operator Overloading.
8. Access Members of a Class Using Pointer to Object Members.
9. Single Inheritance and Multiple Inheritances.
10. Multilevel inheritance, Hierarchical Inheritance and Hybrid Inheritance.
11. Virtual Classes and Abstract Classes.
12. Exception Handling.
13. IOStream, IStream, Ostream classes and their usages.
14. FileStream Operations.
15. Template Based Program to Sort the Given List of Elements.
16. Real World Examples

Reference Books

1. Herbert Schildt, “C++ - From the Ground Up”, McGraw Hill Education, 2nd edition,2010.
2. Stanley B. Lippman, Stanley Lippman, Barbara Moo, “C++ Primer”, Addison-Wesley Professional, 5th edition 2012.

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Web Resources

1. https://www.tutorialspoint.com/cplusplus/index.htm
2. http://www.cplusplus.com/doc/tutorial/
3. https://www.w3schools.com/cpp/
4. https://www.javatpoint.com/cpp-tutorial
5. https://www.geeksforgeeks.org/cpp-tutorial/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	2	-	-	-	-	-	1	-	2	2	3	3
CO2	2	3	1	2	-	-	-	-	-	1	-	2	2	2	2
CO3	2	3	1	2	-	-	-	-	-	1	-	2	3	3	3
CO4	2	3	2	2	-	-	-	-	-	1	-	2	2	2	3
CO5	2	3	1	2	-	-	-	-	-	1	-	2	2	3	2

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P20MCP102	ADVANCED DATA BASE MANAGEMENT SYSTEMS LAB	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives

- To learn and understand DDL & DML
- To learn and understand DCL.
- To learn and understand SQL.
- To learn and understang the Triggers and PL/SQL.
- To learn and understand the database applications.

Course Outcomes

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

CO1 - Implement DDL and DML commands.

CO2 - Implement SQL programs.

CO3 - Develop GUI applications in their known platform.

CO4 – Implementation of Triggers and PL/SQL.

CO5 – Implemntation of Database applications.

LIST OF EXERCISES

1. Create a Table using Data Definition Language (DDL).
2. Modify Table using Data Manipulation Language (DML).
3. Store and Retrieve data through Data Control Language (DCL).
4. Implement Constraints and Built-in functions in various tables.
5. Perform Joins and Group-by functions.
6. Implement Simple Programs in SQL.
7. Create SQL programs using functions.
8. Create SQL programs using procedures.
9. Create SQL programs using triggers.
10. Developing GUI applications.
    - Student Information System.
    - Inventory Management.
    - Payroll Processing.

Reference Books

1. Louis Davidson, StaciaVarga,"Exam Ref 70-762 Developing SQL Databases" 1st Edition, Kindle Edition, 2017.
2. James R. Groff, Paul N. Weinberg, Andrew J. Oppel,"SQL: The Complete Reference", 3rd Edition, 2011.
3. Database Management Systems Laboratory Manual Prepared by Department of Computer Science and Engineering, Sri ManakulaVinayagar Engineering College.

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Web Resources

1. https://www.w3schools.com/sq
2. https://www.tutorialspoint.com/dbms/dbms_useful_resources.htm
3. https://docs.oracle.com/cd/B10501_01/server.920/a96524/c10rsmgr.htm

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	-	-	-	-	-	1	-	2	2	3	3
CO2	2	3	3	2	-	-	-	-	-	1	-	2	2	2	2
CO3	2	3	3	2	-	-	-	-	-	1	-	2	3	3	3
CO4	2	3	3	2	-	-	-	-	-	1	-	2	2	2	3
CO5	2	3	3	2	-	-	-	-	-	1	-	2	2	3	2

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P20MCP103	TALLY LAB	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives:

- To learn the basic accounting terminology, procedures and systems of maintaining accounting records.
- To understand financial statements.
- To learn to create company, enter accounting voucher entries and also print financial statements, etc. in Tally.
- To prepare MIS reports in Tally ERP
- To prepare invoice of the company

Course Outcomes:

After completing this course, the student will be able to

CO1: Educate the students about the usefulness/importance of Tally ERP-9 software for simplifying the accounting methods & procedures.
CO2: Train the students to create/load the company, group, security control, back-up etc.
CO3: Make the student creating the accounting records and extract the financial statements and other statements related to inventory management, depreciation accounting and VAT procedure and records.
CO4: Impart practical training on this software so that the students could apply its various aspect in their day to day business/professional activities.
CO5: Make the students to create invoice for a company.

List of Exercises and Case Study

1. Create, modify, delete Company and Group Company
2. Create, modify, delete Accounting Groups and sub Groups
3. Create, modify, delete Single Ledger and Multiple Ledgers and their Group Allocation
4. Create, modify, delete voucher types
5. Take a simple problem for usage of different accounting vouchers

Case Study:

Prepare a final account for ABC Company using below given sample data:

1. Create a Company as “ABC Company” in Tally with inventory management.
2. Pass the following Entries:
   (i) XYZ started “ABC Company” by bringing Capital Rs.3,00,000/- Cash.
   (ii) He deposited Rs.1,00,000/- cash at ICICI bank.
   (iii) He paid electricity bill for Rs.1,200/- by cash.
   (iv) He withdrawn Rs.10,000/- cash for his personal use.
   (v) He purchased the following item from Vetri Computers Ltd. on credit with 4% Vat
   Computer - 10 Nos. - @20000/- each
   (vi) He sold the following item to Sowmya Traders in cash with 4% Vat rate.
   Computer - 5 Nos. - @27500/- each
   (vii) He received Rs.6,000/- as commission from Rohit by cash.
   (viii) He paid House Rent for Rs.5,000/- by cash.
   (ix) He withdrawn Rs.25,000/- cash from ICICI Bank.
   (x) He purchased furniture for Rs. 25,000/- by cash for office use.
3. Show the Trial Balance and Balance Sheet of “ABC Company”
4. Show the Vat Computation report of the above company.
5. Show the Cash Book & Bank Book of the company.
6. Show the Day Book.
7. Backup and restore the company data

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Text Books

1. Dr.NamrajaAgrawal and Sanjay Kumar, Tally Course Kit, Dream Tech, New Delhi, 2018.
2. Shraddha Singh and NavneetMehra, Tally Course Kit, V&S Publishers, New Delhi, 2018.

Reference Books

1. A.K. Nadhani and K.K.Nadhani ,Tally, BPB Publications, New Delhi,2014.
2. Kogent Learning Solution,Tally, Dream Tech, New Delhi, 2018.
3. S.Palanivel, Tal, Accounting Software,Margham Publications, Chennai, 2018.

Web Resources

1. https://www.youtube.com/watch?v=_Ghu1JlnoZI
2. https://tallysolutions.com/learning-hub/
3. https://www.javatpoint.com/tally
4. https://www.tutorialkart.com/tally/tally-tutorial/

COs/POs/PSOs Mapping

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CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	2	2	-	-	2	-	-	-	-	-	-	-	3	2

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CERTIFICATE COURSE-I

		L	T	P	C	Hrs
P20MCC1XX	**CERTIFICATE COURSE-I**	**0**	**0**	**4**	**-**	**50**

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

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Skill Development Course-I

P20MCS1XX	SKILL DEVELOPMENT COURSE- I	L	T	P	C	Hrs
	(Choose any one of the below three courses)	0	0	4	0	30

1. COMMUNICATION SKILLS LAB

Course Objectives

- To enhance the skills to attend the various standardized test internationally
- To nurture LSRW skills to endorse multifarious skillset
- To know various soft skills to accomplish professional attributes
- To sequence the thought of writing with cohesion and coherence
- To obtain the skill of written communication to meet organizational goals
- To improve self-analysis by strategic planning tool
- To impart knowledge on verbal aptitude

Course Outcomes

At the end of the course, the student will be able to:

CO1: Promote efficacies to attend international standardized test in English language
CO2: Enhance holistic development of LSRW skills and progress in employability skills
CO3: Select, compile and synthesize information for an oral presentation
CO4: Excel in Language fluency and gain self-confidence
CO5: Inculcate the art of professional writing
CO6: Know thyself by self-introspect
CO7: Gain tips to solve verbal aptitude test in competitive exams

UNIT-I WRITING

Listening: Listening Comprehension (TOEFL based) – **Speaking**: Extempore - **Reading:** Reading from Academic Text (TOEFL based) - **Writing:** Read, Listen and Write (TOEFL based)

UNIT-II READING

Listening: Listening and Responding to Video lectures/ Talks - Speaking: Speech based on reading & listening task (TOEFL based) - Reading: Reading Events & sharing ones perspectives Writing: Letter Writing based on situation (IELTS based)

UNIT-III LISTENING AND SPEAKING

Listening Hearing, Speech sounds to overcome Mother Tongue Influence **Speaking**: Etiquettes- Definition- Types- Telephone- Dining- Workplace- Meeting **Reading:** Tweeting & Blogging, Writing**:** SMS & Use of Emoticons- Collocation- Intensifiers- Redundancy- Euphemism

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UNIT-IV IELTS

Listening: Listening & rewriting the context **Speaking:**Mock Interview**–** Personal & Telephonic **Reading:** Cause and Effect **Writing:** Describing chart/ bar diagram (IELTS based)

UNIT-V APTITUDE

Verbal Aptitude (Specific for Competitive Exams)

Reference Books

1. Jeff Butterfield, —Soft Skills for Everyonell, Cengage Learning, New Delhi, 2013.
2. GrantTayler, English conversation practice,English, 1998
3. Baskar, ChellappanCommon errors in English, 2010
4. Cambridge practice tests for IELTS

Web Resources

1. https://www.toppr.com/guides/business-correspondence-and-reporting/communication/barriers-in-communication/
2. https://www.yourarticlelibrary.com/human-resources/emotional-quotient-meaning-definition-components-and-benefits/32401
3. https://www.hamilton.edu/academics/centers/oralcommunication/guides/spoken-language-vs-written-language
4. https://www.toppr.com/guides/business-communication-and-ethics/intro-to-business-communication/telephone-etiquette/
5. https://www.practiceaptitudetests.com/numerical-reasoning-tests/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	-	-	-	2	-	-	2	1	-	-
CO2	-	-	-	-	3	-	-	-	-	3	-	2	1	-	-
CO3	-	-	-	-	3	-	-	-	-	3	-	2	1	-	-
CO4	2	3	3	3	3	3	3	1	3	3	3	3	3	3	3
CO5	3	3	1	-	-	2	3	-	3	2	3	3	3	3	-

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2. FOREIGN LANGUAGES/IELTS-1

Students shall choose any on of the Foreign Languages like French, Japanese, German offered by the reputed organizations. The duration of the course is 30-40 hours specified in the curriculum.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

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3. EXPLORING PHOTOSHOP

Course Objectives

- To understand about the basic Photoshop files and tools
- Explore Photoshop Help, and use it to find out more about the tools in the Toolbox.
- Create a layered Photoshop document from a image
- Create images that demonstrate advanced selection and layering techniques.
- Create a theme based image using Photoshop tools.

Course Outcomes

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

CO1 - Identify elements of the Photoshop user interface and demonstrate knowledge of their functions.

CO2 - Demonstrate knowledge of layers and images

CO3 - Apply painted masks, selection-based masks, gradient masks, and blend modes to create sophisticated image effects.

CO4 - Create adjustment layers for editable, non-destructive changes to image coloration and exposure.

CO5 - Apply special effects to Zooming using masks, paths, and layer styles.

List of Exercises

1. Study of Photoshop files and tools
2. Create a Visiting Card by using appropriate tools in Photoshop.
3. Design a photo frame using custom shapes in Photoshop
4. Convert a color photo to black and white photo
5. Explain the steps for Designing a Passport Size Photo on a Max Size Paper
6. Removing White Background On Logo And Turn Into Transparent Image
7. Zooming Effect in picture
8. Panorama
9. Mass Image Editing Using Photoshop Actions
10. Create a Banner

Text Books

1. Peter Baur, “Photoshop CC For Dummies”, John Wiley & Sons, Third Edition, 2013.
2. Scott Kelby,”Lightroom CC for Digital Photographers”, New Riders, 2015.
3. Martin Evening,”Adobe Photoshop CC for Photographers”, Focal Press, 2014.

Reference Books

1. Elaine Weinmann, Peter Lourekas, “Photoshop CC: Visual QuickStart Guide “,Peachpit press,2014.
2. Andrew Faulkner, Conrad Chavez,” Adobe Photoshop CC”, Adobe Press,2016.
3. Lisa Fridsma, Brie Gyncild,”Adobe After Effects Classroom in a book”, Adobe Press,2020.
4. Derek Lea ,”Creative Photoshop:Digital Illustration and art techniques”,Focal Press,2012
5. Conrad Chavez,”Color Management for Photographers and Designers,” Peach Pit,2014.

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1. https://nptel.ac.in/content/storage2/courses/112101002/downloads/Lec_41-42.pdf
2. https://nptel.ac.in/courses/106/106/106106177/
3. http://www.nptelvideos.com/adobe/adobe_photoshop_tutorials.php
4. https://www.adobe.com/products/captivateprime/content-catalog/creative-cloud/photoshop-cc.html

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CO2	-	-	-	-	3	-	-	-	-	3	-	2	1	-	-
CO3	-	-	-	-	3	-	-	-	-	3	-	2	1	-	-
CO4	2	3	3	3	3	3	3	1	3	3	3	3	3	3	3
CO5	3	3	1	-	-	2	3	-	3	2	3	3	3	3	-

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SYLLABUS

SEMESTER - II

P20MCT201	ADVANCED DATA STRUCTURES AND ALGORITHMS	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To impart the basic concepts of data structures and its terminologies.
- To understand concepts about stack and queue operations.
- To understand basic concepts about linked list and its various operations.
- To understand concepts about Trees, Graphs and its applications.
- To understand basic concepts about divide and conquer, Greedy method and Dynamic programming.

Course Outcomes

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

CO1 – State the fundamentals of data structures and complexity analysis. **(K1)**

CO2 – Relate the operations involved in stack, queue. **(K2)**

CO3 – Solve the operation related to linked lists, Trees and Graphs. **(K3)**

CO4 – Categorize the different sorting, searching and shortest path algorithms. **(K4)**

CO5 – Classify Dynamic programming and its algorithms. **(K2)**

UNIT I BASIC TERMINOLOGIES OF DATA STRUCTURES (12 Hrs)

Introduction: Basic Terminologies: Elementary Data Organizations. Data Structure, Operations: insertion, deletion, traversal. Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Array and its operations. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT II STACK AND QUEUE OPERATIONS (12 Hrs)

Stacks and Queues: Stack and its operations, Applications of Stacks: Expression Conversion and evaluation. Queue: Types of Queue: Simple Queue, Circular Queue, Priority Queue. Operations on each type of Queues.

UNIT III LINKED LIST OPERATIONS, TREES AND GRAPHS (12 Hrs)

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion, Deletion in a linked list, doubly linked list: operations, Circular Linked Lists: operations. Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, Binary Tree Traversals, AVL Tree. Introduction to B-Tree and B+ Tree. Graph: Basic Terminologies and Representations, Graph traversal algorithms.

UNIT IV DIVIDE AND CONQUER, GREEDY METHOD (12 Hrs)

Divide and Conquer method: Solving recurrence relations, Applications- Binary search, Merge sort, Quick sort. Greedy method: General method, applications - Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

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UNIT V DYNAMIC PROGRAMMING **(12 Hrs)**

Dynamic Programming, Applications - Multistage graphs, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design, Chained Matrix Multiplication, Graph Applications: AND/OR graphs, Connected components, Identification of articulation points, Bi-connected components.

Text Books

1. Ellis Horowitz, SartajSahni," Fundamentals of Data Structures", Illustrated Edition, Computer Science Press, 2018.
2. Thomas H. Coreman, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", PHI, Third Edition, 2010.
3. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, "Data Structures and Algorithms", 4th Edition, 2009.

Reference Books

1. Mark Allen Weiss," Algorithms, Data Structures and Problem Solving with C++", Illustrated Edition, Addison-Wesley Publishing Company, 1995.
2. Michael T. Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis and Internet Examples, Wiley India, 2006.
3. Sara Baase and Allen Van Gelder, Computer Algorithms Introduction to Design and Analysis, 3rd Edition, Pearson Education Asia, 2010.
4. Donald E Knuth, The Art of Computer Programming, Volume I & II, Revised Re-Third Edition, Addison Wessely, 2011

Web Reference

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.javatpoint.com/data-structure-tutorial/
3. https://www.studytonight.com/data-structures/
4. https://www.tutorialspoint.com/data_structures_algorithms/
5. https://www.w3schools.in/data-structures-tutorial/intro/
6. https://www.academia.edu/38287655/Design_and_analysis_of_algorithms_tutorial
7. https://www.geeksforgeeks.org/fundamentals-of-algorithms/

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CO2	3	3	-	-	-	3	-	-	-	-	-	-	2	2	2
CO3	3	3	-	-	-	3	-	-	-	-	-	-	2	2	2
CO4	3	3	-	-	-	3	-	-	-	-	-	-	2	2	2
CO5	3	3	-	-	-	3	-	-	-	-	-	-	2	2	2

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P20MCT202	ADVANCED COMPUTER NETWORKS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To understand the concepts of data communications and to study the functions of different layers.
- To understand the functionalities and components involved in the physical layer.
- To learn the basic concepts of data link layer services and network layer communication protocols
- To understand various load characteristics and network traffic conditions, decide the transport protocols to be used.
- To learn the different protocols available in application layer.

Course Outcomes

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

CO1– Define network and its components. **(K1)**

CO2 – Classify the Physical layer functionalities, Transmission modes and media. **(K2)**

CO3- Compare different data link services and routing algorithms. **(K2)**

CO4 - Describe different protocols in transport and application layer. **(K1)**

CO5 – Illustrate different networks used in the modern world. **(K2)**

UNIT I INTRODUCTIONS **(9 Hrs)**

Introduction to Networks and Communication Media: Uses – Network Hardware- Network Software – OSI, TCP/IP Reference Models. - Network Topologies - Internet Architecture - Networking Devices - Modems - Routers - Switches – Gateways.

UNIT II PHYSICAL LAYER **(9 Hrs)**

Physical layer functionalities - Analog to digital conversion using PCM, Transmission Modes: simplex, half duplex and full duplex - Transmission Media - Copper – Fiber – Optical – Radio (wireless), Switching: Introduction, Circuit Switched Networks and Packet switching.

UNIT III DATA LINK LAYER AND NETWORK LAYER **(9 Hrs)**

Data link layer services - Error Detection and Correction – Sliding window protocols - Network devices. Network layer functionality - Routing Algorithms: The Optimality Principle – Shortest path algorithm, Distance vector routing, Link state routing, Hierarchical routing, Broadcast, Multicast routing- Classful Addressing – Subnetting – Network layer protocols: IPV4, IPV6.

UNIT IV TRANSPORT LAYER AND APPLICATION LAYER **(9 Hrs)**

The Transport Services - Connection management – Transport layer Congestion Control – Transport Layer Protocols: User Datagram Protocol (UDP) – Transmission Control Protocol (TCP). Application Layer Protocols – HTTP – FTP – Telnet – Email (SMTP, POP3, IMAP, MIME) – DNS – Need for Cryptography and Network Security – Firewalls.

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UNIT V MODERN NETWORKS **(9 Hrs)**

Mobile Networks, Sensor Networks, Vehicular Networks, Underwater Networks and Body Area networks and related performance issues.

Text Books

1. Behrouz A. Forouzan, Data Communications and Networking, Fourth Edition TMH, 2006.
2. Tanenbaum,A.S. and David J. Wetherall “Computer Networks”, 5th ed., Prentice Hall, 2011
3. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, Third edition, 2006.
4. Top-Down Network Design- Networking Technology, Author Priscilla Oppenheimer, Publisher- Pearson Education, 2010.
5. Computer Networking: A Top-Down Approach (6th Edition), J Kurose and KW Ross,Pearson, 2012.

Reference Books

1. Larry L. Peterson and Bruce S. Davie, “Computer Networks- A system approach”, 5th edition, ELSEVIER, 2012
2. Stallings, W., 'Data and Computer Communications', 10th Ed., Prentice Hall Int. Ed., 2013

Web Reference

1. https://www.geeksforgeeks.org/last-minute-notes-computer-network/
2. https://lecturenotes.in
3. https://www.cse.iitk.ac.in/users/dheeraj/cs425/

COs/POs/PSOs Mapping

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CO3	3	3	-	-	-	3	-	-	-	-	-	-	3	2	-
CO4	3	1	-	-	-	3	-	-	-	-	-	-	-	-	-
CO5	3	1	-	-	-	2	-	-	-	-	-	-	-	-	-

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P20MCT203	JAVA PROGRAMMING	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- Gain and explore the knowledge of java programming
- To know the principles of inheritances, packages, interfaces
- To get familiarized to generic programming, multithreading concepts.
- Gain and explore the advanced concepts in Java.
- To learn and understand AWT and JDBC

Course Outcomes

After completion of the course, students will be able to

CO1 – Define the basic concepts of object oriented programming in Java. **(K1)**

CO2 - Describe the use of inheritance, interface and package in relevant applications. **(K1)**

CO3 - Solve java applications using exception handling, thread and generic programming. **(K3)**

CO4 – Illustrate Java Collections and IO streams. **(K4)**

CO5 - Implement simple database programs using AWT and JDBC. **(K3)**

UNIT I INTRODUCTION TO JAVA PROGRAMMING (9 Hrs)

The History and Evolution of Java - Byte code - Java buzzwords - Data types – Variables – Arrays – operators - Control statements -Type conversion and casting. Concepts of classes and objects: Basic Concepts of OOPs –Constructors -Static keyword -Final with data -Access control - This key word - Garbage collection - Nested classes and inner classes - String class.

UNIT II INHERITANCE, PACKAGES AND INTERFACES (9 Hrs)

Inheritance: Basic concepts - Forms of inheritance - Super key word – Method overriding -Abstract classes- Dynamic method dispatch - The Object class. Packages: Defining, Creating and Accessing - Importing packages. Interfaces: Defining – Implementing – Applying - Variables and extending interfaces

UNIT III EXCEPTION HANDLING, MULTITHREADING (9 Hrs)

Concepts of Exception handling - Types of exceptions - Creating own exception - Concepts of Multithreading - Creating multiple threads – Synchronization -Inter thread communication - Enumeration - Autoboxing - Generics.

UNIT IV COLLECTIONS, I/O STREAMS (9 Hrs)

Collections: List –Vector – Stack - Queue – Deque –Set - SortedSet. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files.

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UNIT V EVENT DRIVEN PROGRAMMING AND JDBC (9 Hrs)

Events - Delegation event model -Event handling - Adapter classes. AWT: Concepts of components - Font class - Color class and Graphics - Introduction to Swing – Layout management - Swing Components - Java Database Connectivity - Programming Example.

Text Books

1. Herbert Schildt,Java: The Complete Reference 11th Edition, TMH Publishing Company Ltd, 2018.

Reference Books

1. Cay S. Horstmann, Gary cornell, Core Java Volume –I Fundamentals, 9thEdition, Prentice Hall, 2013.
2. H.M.Dietel and P.J.Dietel,Java How to Program, 11thEdition, Pearson Education/PHI, 2017.
3. Cay.S.Horstmann and Gary Cornell,Core Java, Vol 2, Advanced Features, 8th Edition, Pearson Education, 2008.

Web Reference

1. http://www.ibm.com/developerworks/java/
2. http://docs.oracle.com/javase/tutorial/rmi/.
3. IBM's tutorials on Swings, AWT controls and JDBC.
4. https://www.edureka.co/blog
5. https://www.geeksforgeeks.org

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CO2	3	3	2	-	2	3	-	-	-	-	-	-	2	3	-
CO3	3	3	3	-	2	3	-	-	-	-	-	-	2	3	-
CO4	3	3	3	-	2	3	-	-	-	-	-	-	2	3	-
CO5	3	3	3	-	2	2	-	-	-	-	-	-	2	3	1

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P20MCT204	WEB APPLICATION DEVELOPMENT	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To introduce the concepts of Basic web development tools.
- To gain insight into the XML language for each storage and access of data.
- To understand the concepts of database .and its connectivity methods.
- To study the concepts of JSP and the methods.
- To gain in depth knowledge about PHP and AJAX.

Course Outcomes:

At the end of the Course, the Student will be able to:

CO1 – Define the concepts of fronts end development tools. **(K1)**

CO2 – Describe the use of XML in designing web application. **(K1)**

CO3 – Demonstrate the use of JDBC and Servlets. **(K3)**

CO4 - Discuss the components of JSP container and script lets. **(K2)**

CO5 - Implement web pages using AJAX and PHP. **(K3)**

UNIT- I INTRODUCTION TO HTML (9 Hrs)

INTRODUCTION TO HTML5: New HTML5 Form Input Types, Introduction to Cascading Style Sheets: Part 1: Inline Styles, Embedded Style Sheets, Conflicting Styles, and Linking External Style Sheets.

JAVA SCRIPT: Introduction to scripting, Control Structures-I, Control Structures-II, Functions, Arrays, Objects.

UNIT- II INTRODUCTION TO XML (9 Hrs)

XML: Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3C XML Schema Documents, XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM): Objects and Collections.

UNIT- III OVERVIEW OF JDBC (9 Hrs)

JDBC AND SERVLETS: DATABASE ACCESS: Overview of JDBC, JDBC Drivers, connecting to a Database, the Statement Interfaces, Result Sets, Using Metadata

SERVLETS: The Life Cycle of a Servlet, Using Tomcat for Servlet Development, A Simple Servlet, The Servlet API, The javax.servlet Package , Reading Servlet Parameters, The javax.servlet.http Package, Handling HTTP Requests and Responses, Cookies, Session Tracking.

UNIT- IV OVERVIEW OF JSP (9 Hrs)

JSP: JSP Overview, How JSP Works, A Basic Example, JSP Syntax and Semantics: The JSP Development Model, Components of a JSP Page: Directives, Comments, Expressions, Scriptlets, Declarations, implicit objects, Standard Actions, Tag Extensions, A Complete Example.

Expressions, Scriptlets, Expression and Scriptlet Handling by the JSP Container, Implicit Objects and the JSP Environment, Initialization Parameters, Request Dispatching: Anatomy of Request Processing, include Directive, The Action, Forwarding Requests, RequestDispatcherObject.

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UNIT- V INTRODUCTION TO PHP **(9 Hrs)**

PHP: Introduction, Simple PHP Program, Converting Between Data Types, Arithmetic Operators, Initializing and Manipulating Arrays, String Comparisons, String Processing with Regular Expressions, Form Processing and Business Logic, Reading from a Database. AJAX: Traditional Web Applications vs. Ajax Applications, Rich Internet Applications (RIAs) with Ajax, History of Ajax, Ajax Example Using the XML, HttpRequest Object, Using XML and the DOM.

Text Books:

1. Dietel and Dietel : "Internet and World Wide Web – How to Program", 5th Edition, PHI/Pearson Education, 2011

2. Herbert Schildt, "The complete Reference Java 2", 9th Edition, TMH, 2014.

3. Phil Hanna: "The Complete Reference JSP", 2nd Edition, TMH, 2008.

Reference Books

1. Hans Bergsten: "Java Server Pages", 3rdEdition, O'Reillypublication, 2008.

2. Raj Kamal, "Internet & Web technologies", 8th Edition, Tata McGraw-Hill, 2007.

3. Chris Bates, "Web Programming, building internet applications", 2ndEdition, WILEY, Dreamtech, 2008.

4. Xavier. C, "Web technology and design", 1stEdition, New Age International, 2011.

5. Marty Hall and Larry Brown, "Core servlets and java Server pages' volume 1: core technologies", 2nd Edition, Pearson Education, 2007.

6. Thomas A Powel, "The Complete Reference: AJAX", 1st Edition, Tata McGraw Hill, 2008. WEB

Web References:

1. www.w3schools.com

2. www.tutorialspoint.com

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CO3	3	3	3	-	3	3	-	-	3	-	-	-	3	3	2
CO4	3	3	3	-	3	3	-	-	3	-	-	-	3	3	2
CO5	3	3	3	-	3	3	-	-	3	-	-	-	3	3	2

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P20MCP201	ADVANCED DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives

- To learn the basic concepts of Data Structures.
- To learn about the concepts of Searching and Sorting.
- To study about the linear and non-linear Data Structures.
- To learn and understand the linked list.
- To learn and understand Tree and Graph Traverssals techniques.

Course Outcomes

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

CO1 - Analyze the algorithm's / program's efficiency in terms of time and space complexity.

CO2 - Solve the given problem by identifying the appropriate Data Structure.

CO3 – Solve problems in linear Data Structures.

CO4 – Solve problems on Trees and Tree Traversals

CO5 - Solve problems on Graphs and Graph Traversals

LIST OF EXERCISES

1. Write a C program to implement recursive and non-recursive i) Linear search ii) Binary Search.
2. Write a C program to implement i) Bubble sort ii) Selection sort iii) Insertion sort iv) Shell sort v) Heap sort.
3. Write a C program to implement the following using an array. a) Stack ADT b) Queue ADT
4. Write a C program to implement list ADT to perform following operations a) Insert an element into a list. b) Delete an element from list c) Search for a key element in list d) count number of nodes in list.
5. Write a C program to implement the following using a singly linked list. a) Stack ADT b) Queue ADT.
6. Write a C program to implement the dequeue (double ended queue) ADT using a doubly linked list and an array.
7. Write a C program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree.
8. Write a C program that use recursive functions to traverse the given binary tree in
    - Preorder
    - In order
    - Post order
9. Write a C program to perform the AVL tree operations.
10. Write a C program to implement Graph Traversal Techniques.

Reference Books

1. Ellis Horowitz, SartajSahni," Fundamentals of Data Structures", Illustrated Edition, Computer Science Press, 2018.

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Web Reference

1. https://www.tutorialspoint.com/data_structures_algorithms/
2. https://www.w3schools.in/data-structures-tutorial/intro/
3. https://nptel.ac.in/courses/106103069/
4. https://swayam.gov.in/nd1_noc20_cs70/preview

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CO3	3	-	3	3	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	2	2	-
CO5	-	-	3	3	-	-	-	-	-	-	-	-	2s	2	2

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P20MCP202	JAVA PROGRAMMING LAB	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives

- To acquire programming skill in core java.
- To learn how to design java program and applications.
- To acquire object oriented skills in java.
- To develop the skill of designing applications.
- To implement java packages and exception handling.

Course Outcomes

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

CO1 - Apply and practice logical formulations to solve simple problems leading to specific applications.

CO2 - Demonstrate the use of inheritance, interface and package in relevant applications.

CO3 - Create java applications using exception handling, multithread.

CO4 - Build java distributed applications using Collections and IO streams.

CO5 - Develop simple graphical user interfaces using GUI components.

LIST OF EXERCISES

1. Develop simple programs using java syntax and semantics.
2. Develop a java program that implements class and object.
3. Write a java program to demonstrate inheritance.
4. Develop a simple real life application program to illustrate the use of Multi Threads.
5. Implement simple applications using Collections.
6. Develop a simple application and use JDBC to connect to a back-end database.
7. Create a student application with Add, Edit, Delete, Show functions using JDBC.
8. Create a Bill Application to store sales details using JDBC.
9. Create java applications using Exception Handling for error handling.
10. Develop a java program that implements the Packages.

Reference Books

1. Java: The Complete Reference 11th Edition, 2018, Herbert Schildt, TMH Publishing Company Ltd, New Delhi, ISBN: 9781260440249.
2. Cay S. Horstmann, Gary cornell, —Core Java Volume –I Fundamentals‖, 9th Edition, Prentice Hall, 2013.
3. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI
4. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.

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Web Reference

1. http://www.ibm.com/developerworks/java/
2. http://docs.oracle.com/javase/tutorial/rmi/.
3. IBM's tutorials on Swings, AWT controls and JDBC.
4. https://www.edureka.co/blog
5. https://www.geeksforgeeks.org

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CO2	3	3	3	3	3	-	-	-	-	-	-	-	2	2	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	2	2	2
CO4	3	3	-	3	3	-	-	-	-	-	-	-	-	2	-
CO5	3	3	3	3	3	-	-	-	3	-	-	-	2	2	2

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P20MCP203	WEB APPLICATION DEVELOPMENT LAB	L	T	P	C	Hrs
		0	0	4	2	45

Course Objective

- To understand the basic concepts of PHP
- To understand string concepts in PHP.
- To learn about arrays in PHP.
- To learn about file handling concepts in PHP
- To understand the concepts of form.
- To develop a form and link the form with data base using PHP.

Course Outcome

After completion of the course, the students should be able to:

CO 1 - Explain and program with basic concepts of PHP.

CO 2 - Design a form and work with form.

CO 3 - Understanding POST/GET, Session

CO 4 - Understanding cookies.

CO 5 - Understanding PHP and Database connectivity.

CO6 - Design a web application.

LIST OF EXERCISES

1. Write a program in PHP to handle numbers, strings.
2. Write a program in using if else, else if statements, loops.
3. Write a simple program in PHP to manipulate array values.
4. Write a function in PHP to generate random password.
5. Write a program in PHP for processing a simple form (use controls like checkbox, radio buttons and options).
6. Write a program in PHP to upload file using form control.
7. Write a program in PHP for a simple POST and GET functions.
8. Write a program in PHP for setting and retrieving a Session.
9. Write a program in PHP for setting and retrieving a Cookie.
10. Design a login form using cookies, bootstrap, PHP, Database.
11. Design an event registrationform using bootstrap, PHP, Database.
12. Design a student form with add, update, delete, display all and search option using student database.
13. Micro Project.

Reference Books

1. Leon Atkinson," Core PHP Programming: Using PHP to Build Dynamic Web Sites", Paperback,2000.
2. Keith Wald, Jason Lengstorf," Pro PHP and jQuery", Paperback,2016.
3. StevenSuehring, Janet Valade, "PHP, MySQL, JavaScript& HTML5 All-in-One", John Wiley & Sons, Inc,2013.

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Web Reference

1. https://www.w3schools.com/php/DEFAULT.asp
2. https://www.tutorialspoint.com/php/index.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CO1	3	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1
CO4	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1
CO5	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1

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CERTIFICATE COURSES-II

P20MCC2XX	CERTIFICATE COURSE-II	L	T	P	C	Hrs
		0	0	4	-	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree

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SKILL DEVELOPMENT COURSE-II

P20MCS201	SKILL DEVELOPMENT COURSE- II	L	T	P	C	Hrs
		0	0	4	0	50

Students shall choose any one certification courses from NPTEL / MOOC / SWAYAM offered through online platform. The duration of the course is 4-12 weeks, which will be offered through online.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

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SYLLABUS

SEMESTER - III

P20MCT301	MACHINE LEARNING	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To understand the basic concepts of machine learning and probability theory.
- To understand supervised learning techniques.
- To understand unsupervised learning techniques.
- To understand the theoretical and practical aspects of probabilistic graphical models.
- To learn advanced machine learning aspects.

Course Outcomes

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

CO1 - Elucidate the basic concepts of machine learning and probability theory. (K1)

CO2 - Use supervised learning techniques for different types of applications. (K2)

CO3 - Design and implement unsupervised learning algorithms. (K3)

CO4 - Implement appropriate graph models for any real time application. (K3)

CO5 - Explain advanced learning techniques. (K4)

UNIT I INTRODUCTION (9Hrs)

Machine Learning – Types of Machine Learning – Basic Concepts of Machine Learning - Machine Learning Process –Weight Space - Testing Machine Learning Algorithms - Turning Data into Probabilities – The Bias-Variance Trade off – Concept Learning and General-to-Specific Ordering.

UNIT II SUPERVISED LEARNING (9Hrs)

Linear Discriminants – Perceptron – Linear Separability – Linear Regression - Multi Layer Perceptron – Going Forward – Going Backward - Support Vector Machine Algorithm - Decision Tree Learning – Random Forest Model.

UNIT III UNSUPERVISED LEARNING (9Hrs)

K-means Algorithm –Hierarchical clustering - EM algorithm – Dimensionality Reduction Techniques - Vector Quantization – Self Organising Feature Map.

UNIT IV GRAPHICAL MODELS (9Hrs)

Bayesian Networks – Conditional Independence - Markov Random Fields – Naive Bayes Classifier - Hidden Markov Model – Tracking Methods.

UNIT V ADVANCED LEARNING (9Hrs)

Reinforcement Learning – The Learning Task – Q Learning – Temporal Difference Learning – Generalization – Relationship to Dynamic Programming - Ensemble Learning – Boosting – Bagging – Deep Learning.

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Text Books

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.

Reference Books

1. EthemAlpaydin, —Introduction to Machine Learning 3E (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.
2. MiroslavKubat, - An Introduction to Machine Learning, Springer Publications, 2E, 2017.
3. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
4. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014.

Web References

1. https://machinelearningmastery.com/
2. https://towardsdatascience.com/machine-learning/home/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CO3	3	3	3	3	-	2	-	-	2	1	3	-	3	2	-
CO4	3	-	2	3	3	2	2	-	-	1	3	-	3	3	-
CO5	3	3	3	3	2	2	2	-	2	1	3	-	3	3	3

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P20MCT302	AGILE SOFTWARE DEVELOPMENT AND TESTING	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To know about the Software Engineering and process
- To study about the Software Testing & Strategies
- To understand about the Agile software development Process
- To get knowledge in Agile methodology and
- To get adequate knowledge in Agile global development & Quality Assurance

Course Outcomes

On successful completion of the course students will be able to:

CO1 - Understand about the Software Engineering and metrics. **(K1)**

CO2 - Understand about the Software testing and strategies. (**K2)**

CO3 - Identify the Agile process and driven development. **(K3)**

CO4 - Develop technique and methodology to improve the software development. **(K1)**

CO5 - Show how the agile process can be used in the quality assurance. **(K3)**

UNIT I INTRODUCTION TO SOFTWARE ENGINEERING **(9 Hrs)**

Introduction to Software Engineering : Overview of Software Engineering- Software Process – Software Product – Software Process Models – Software Project Planning – Project Scheduling and Tracking – Software Metrics - System Engineering – Business Process Engineering – Product Engineering – Requirement Engineering – Software analysis and Principles – Software architecture – Design concepts and principles – User interface design

UNIT II SOFTWARE TESTING (**9 Hrs)**

Software Testing : Introduction to Software Testing – Testing Principles – Need for Testing – Testing strategies - Software Testing techniques – Psychology of testing – White box testing – Black Box testing – Gray Box testing – Robustness testing - Verification and Validation testing – Syntax testing – Unit testing – Integration testing – System testing – levels of testing

UNIT III INTRODUCTION TO AGILE PROCESS **(9 Hrs)**

Introduction to Agile Process: - Introduction Agile - Concepts of Agile process - Agile Driven development - Scrum: Concepts – deliverable and methods. Extreme Programming: Concepts – deliverable – methods. Unified Process: Concepts – deliverable - methods. EVE: Concepts – methods – deliverable.

UNIT IV AGILE TECHNOLOGY AND METHODOLOGY **(9 Hrs)**

Agile Technology and Methodology: Concepts of Agile management – Agile Principles – Agile Software model –Agile Method classification -Agile Project management –- Agile Ethics – Agile in Design, Testing, Documentation – Agile Drivers

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UNIT V KNOLEDGE MANAGEMENT AND QUALITY ASSURANCE (9 Hrs)

Agile Knowledge Management and Quality Assurance : Introduction to Agile Information systems – Agile development – Knowledge Management in Software Engineering – Issues and challenges of Agile methodology – Agile product development – Agile metrics – Agile Quality Assurance – Agile global software development

Text Books

1. Roger S. Pressman, Software Engineering. A Practitioners Approach, Fifth Edition, 2001
2. Richard Farley , Software Engineering Concepts , Tata McGraw Hill, 2003.
3. William E.Perry, *" Effective Methods for Software Testing (2nd Edition) "*,John Wiley & Sons, 2000.
4. Craig Larman, “Agile and Iterative Development A Manger’s Guide” Pearson Education,First Edition, India, 2004.
5. DavidJ.Anderson and Eli Schragenheim,”Agile Manament for Software Engineering: applying the theory of constraints for business results”,Prentice Hall, 2003.

Reference Books

1. GlenfordJ.Myers, *"The Art of Software Testing "*, John Wiley & Sons, 1997.
2. Boris Beizer, Black-Box Testing: *"Techniques for Functional Testing of Software and Systems",*John Wiley & Sons, 1995.
3. P.C.Jorgensen, *" Software Testing - A Craftman's Approach ",* CRC Press, 1995.
4. C. Ghezzi, M. Jazayeri and D. Mandrioli, Fundamentals of Software Engineering ,Printice Hall of India Private Limited, 2nd Edition,2002.
5. Shore, “Art of Agile Development”, Shroff Publishers & Distributors, 2007.
6. KevinC.Desouza “Agile Information systems:” conceptualization, construction and Management”, Butterworth- Heinemann, 2007

Web References

1. https://udemy.com
2. https://udacity.com
3. https://www.digimat.in/
4. https://nptel.ac.in/courses/

COs/POs/PSOs Mapping

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CO3	3	3	3	3	2	2	3	-	2	1	3	-	3	3	3
CO4	3	-	3	-	3	2	2	-	2	1	3	-	3	3	-
CO5	3	-	3	-	2	2	2	-	2	1	3	-	3	3	-

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P20MCT303	C# AND .NET	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To understand the fundamentals of developing modular application by using object oriented concepts.
- To utilize the C# and .NET framework to build distributed enterprise applications.
- To develop Console Application, Windows Application and Web Applications.
- To connect to multiple data sources and managing them effectively.
- To learn the product development.

Course Outcomes

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

CO1 -Learn about MS.NET framework developed by Microsoft. **(K1)**

CO2 - Develop and implement Applications with C#. **(K2)**

CO3 - Design the interface for application development. **(K2)**

CO4 - Understand the .NET framework and deployment in the .NET**. (K3)**

CO5 - Explore Assemblies and Deployment in .NET enterprise applications. **(K3)**

UNIT I INTRODUCTION (9 Hrs)

Common Language Runtime(CLR) - The Common Type Specification(CTS) - The Common Language Specifications (CLS) - Solution Explorer - Data Type - Operators - Decision Making - Looping - Iteration Arrays - Strings - Class - Name Spaces – Collections.

UNIT II C# FORMS (9 Hrs)

Windows Forms - Toolbox - Property box - Basic control - Events - Label - Text Box - Button – RadioButton - Combo Box - List Box - Panel – PictureBox. DateTimePicker – MonthCalendar – OpenFileDialog – SaveFileDialog – ToolTip - Tab Control - Rich Textbox - Menu - Link Label–Web Browser.

UNIT III C# ADO.NET (9 Hrs)

Connection Class - Command Class - Data Reader Class - Data Adaptor Class - Dataset. Class – DataGrid View.

UNIT IV C# UNDERSTANDING DATABASE APPLICATION (9 Hrs)

Develop a Windows Application using database: Add Edit, Modify, Delete, Search, Show functions.

UNIT V C# WINDOWS APPLICATION (9 Hrs)

Enterprise Edition Overview – Multi-Tier Architecture – Best Practices – Comparison between J2EE and .NET.

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Text Books

1. David Chappell, “Understanding .NET – A Tutorial and Analysis”, Addison Wesley, 2002.
2. Herbert Schildt, “C# 3.0 The Complete Reference”, McGraw-Hill Professional, Third Edition, 2009.
3. Keogh, “J2EE the Complete Reference”, Tata McGraw-Hill, 2015.

Reference Books

1. Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Sixth edition, A Press, 2012.
2. Joh Skeet, C# in depth, Manning publications, Third Edition, 2014. .
3. AdrewStellman and Jennifer Greene, Head First C#, Third Edition, O’Reilly, 2013.

Web References

1. https://www.c-sharpcorner.com/csharp-tutorials
2. https://www.guru99.com/c-sharp-tutorial.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CO1	3	1	1	1	3	1	1	-	2	1	3	-	2	1	1
CO2	3	3	3	3	3	3	3	-	2	1	3	-	3	1	3
CO3	3	-	3	3	2	-	3	-	2	1	3	-	3	3	3
CO4	3	3	3	3	3	-	2	-	2	1	3	-	3	3	-
CO5	3	-	3	3	2	2	2	-	2	1	3	-	3	3	-

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P20MCT304	MOBILE APPLICATION DEVELOPMENT	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To understand about Android SKD
- To understand the basic of Android application development
- To inculcate working knowledge of Android application
- To know about the J2EE concepts
- To understand about the Object technology

Course Outcomes

On successful completion of the course students will be able to

CO1 - Identify various concepts of mobile programming **(K1)**

CO2 - Understand the Program mobile applications for the Android operating system. **(K2)**

CO3 - Develop mobile applications on their design. **(K2)**

CO4 - Develop mobile application with database. **(K2)**

CO5 - Gain adequate knowledge in Object Technology in Web. **(K3)**

UNIT – I INTRODUCTION TO MOBILE COMPUTING **(9 Hrs)**

Introduction to Mobile Computing: Overview Android - Android Development Environment- Understanding Anatomy of Android Application – Factors in Developing Mobile Applications- Mobile Software Engineering- Android Software Development Kit – Terminologies – Characteristics of Mobile Applications - Android applications Context – File Setting – Intent Filter

UNIT II ANDROID APPLICATIONS DESIGN (**9 Hrs)**

Android Applications Design – Generic UI Development- Android User – more on UI and VUI - User interface design – Multichannel and Multimedia UIs - Layouts – Framing – Android Intents and Services -Screen design elements – Drawing – Imaging - Activities – Permission – Image with Animation- Software Installation

UNIT III INTRODUCTION TO ANDROID DATABSE **(9 Hrs)**

Introduction to Android Database: Android Storing and Retrieving Data - SQLite – Managing data with SQLite – Data base connectivity – Application with Database – Android Data and Storage – Developing Android API – Android Mobile API -Android applications Testing Strategies , Android application publishing, Android preferences, Application development with different types of resources. Application using Content provider

UNIT IV INTRODUCTION TO WEB **(9 Hrs)**

Introduction to web: The internet: Introduction and overview of the World Wide Web, hardware and software technology for Web applications development - web-browser portability. Introduction of HTML: introduction, markup language, Editing HTML with common tags, Basic of HTML tables : intermediate HTML tables and formatting - HTML forms,HTML5 Input Types & Attributes – Web application using database.

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UNIT V OBJECT TECHNOLOGY IN WEB **(9 Hrs)**

Object Technology in web - Introduction -Enterprise Architecture Styles - J2EE Architecture - J2EE Technologies - Developing J2EE Applications - Naming and directory services - Application Servers - Implementing the J2EE- Specifications - J2EE packaging and Deployment- Introduction to web server : Architecture Model and PHP: Overview of PHP Capabilities, PHP HTML embedding tags & syntax, Simple script - PHP & HTTP Environment-PHP Language Core-Variables, constants, data types, PHP: operators, flow control, loops, Arrays, string, functions statements - Simple File operation - Directory access operations, Processing HTML form-Sending E-mail, Database Operations with PHP.

Text Books

1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", PearsonEducation, 2nd ed. ,2011.
2. Harvey M. Dietel, Paul Dietel& Tem R. Nieto, ",Internet& World Wide Web How to Program", Pearson, 2011
3. Ivan Bayross. "Web enabled commercial application development using HTML, DHTML, JavaScript, PERL-CGI", BPB Publications, 2010

Reference Books

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. Barry Burd "Android Application Development All in one for Dummies by, Edition I-2014
4. Chuckmusiano and Bill Kenndy, HTML The Definite Guide , O Reilly publications, 2000.
5. G. James Lee, BrentWare , "Open Source Development with LAMP: Using Linux, Apache, MySQL, Perl, and PHP" AddisonWesley, Pearson 2009.

Web References

1. https://www.c-sharpcorner.com/csharp-tutorials
2. https://www.guru99.com/c-sharp-tutorial.html

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CO3	3	-	3	3	2	2	3	-	2	1	3	3	3	3	-
CO4	3	3	-	3	3	2	2	-	2	1	3	3	3	3	-
CO5	3	3	3	-	2	2	2	2	2	1	3	3	3	3	3

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P20MCP301	C# AND .NET LAB	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives

- To understand the development .NET Programming.
- To study the object oriented concepts through application development.
- To develop applications and establish connection with database.
- To implement multi thread concepts
- To dvelop an application using tools

Course Outcomes

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

CO1 - Explore in the Object Orientation using C#.Net. **(K1)**

CO2 - Understand the Exception Handling, Operator Overloading **(K2)**

CO3 – Implemtntaion usijg Multi-Threading in C#.Net **(K4)**

CO4 - Develop an application using C# with ADO.Net. **(K3)**

CO5 – Implementing an application using tools.**(K4)**

LIST OF EXPERIMENTS

1. Develop an application to implement Inheritance concepts
2. Develop a console application that implements Classes and Objects concepts
3. Implement Polymorphism concepts with window form applications
4. Develop a window form application to implement an Interfaces
5. Implement an Operator Overloading concepts
6. Develop an application to brief about Delegates and Events
7. Write an application that elaborate any one of Exception Handling
8. Implement a concepts of Multi-Threading with starting of multiple threads
9. Develop an interactive application to connect database through ADO.NET
10. Develop an application to implement multiple tools for design graphical interfaces

Reference Books

1. David Chappell, “Understanding .NET – A Tutorial and Analysis”, Addison Wesley, 2002.
2. Herbert Schildt, “C# 3.0 The Complete Reference”, McGraw-Hill Professional, Third Edition, 2009.
3. https://www.c-sharpcorner.com/csharp-tutorials.

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Web References

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CO4	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1
CO5	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1

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P20MCP302	MOBILE APPLICATION DEVELOPMENT LAB	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives

- To make the students work on real time platforms of cloud computing and make them understand the necessity and usage of Cloud

Course Outcomes

Upon successful completion of the course, students will be able to

CO1 - Configure various virtualization tools such as Virtual Box, VMware workstation. **(K1)**

CO2 - Design and deploy a web application in a PAAS environment. **(K2)**

CO3 - Simulate a cloud environment to implement new schedulers. **(K3)**

CO4 - Install and use a generic cloud environment that can be used as a private cloud. **(K2)**

CO5 - Manipulate large data sets in a parallel environment. **(K3)**

LIST OF EXPERIMENTS

I CYCLE

1. Install Virtual box/VMware Workstation with windows OS on top of windows8 and Higher.
2. Creating a Warehouse Application in SalesForce.com.
3. Install Google App Engine. Create hello world app and a simple web applications using python/java.
4. Simulate a cloud scenario using CloudSim and run a scheduling algorithm in CloudSim.
    - Space Shared - Batch Process scheduling.
    - Time Shared - Round-Robin scheduling.
5. Implementation of Para-Virtualization using VM Ware‘s Workstation/ Oracle‘s Virtual Box and Guest O.S.

II CYCLE

6. Transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack/Amazon Web Service (Online Openstack/AWS Demo Version).
8. Installation and Configuration of Hadoop.
9. Create an application (Ex: Word Count) using Hadoop Map/Reduce.
10. Case study on Paas(Facebook) and AWS.

Web References

1. https://aws.amazon.com/getting-started/hands-on/launch-windows-vm/
2. https://cloud.google.com/appengine/docs/standard/nodejs/building-app/creating-project
3. https://www.cloudsimtutorials.online/cloudsim-simulation-toolkit-an-introduction

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COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CO3	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1
CO4	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1
CO5	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1

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P20MCP303	MINI PROJECT	L	T	P	C	Hrs
		0	2	4	3	45

Course Objectives

- The students are expected to complete the project and to submit a full-fledged report comprising of the complete system developed along with the implementation and the test results.

Course Outcomes

On successful completion of this Project Phase, the students will be able to:

CO1 - Master a programming language or software tool used for implementation. **(K1)**

CO2 - Test the project and compare it with benchmark standards. **(K1)**

CO3 - Prepare the Project Report. **(K2)**

CO4 - Develop the presentation skills. **(K2)**

CO5 - Develop the ability to work in a Group. **(K3)**

LIST OF MODULE

1. Master a programming language or software tool used for implementation
2. Test the project and compare it with benchmark standards
3. Prepare Project Report
4. Develop Presentation skills
5. Develop ability to work in a Group

Reference Books

1. Books related to the Project Title
2. Papers published in Reputed Journals and Conferences related to the Project Title

COs/POs/PSOs Mapping

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CO3	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1
CO4	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1
CO5	3	3	3	3	-	-	-	-	-	-	-	-	2	2	1

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CERTIFICATE COURSES-III

P20MCC3XX	CERTIFICATE COURSE-III	L	T	P	C	Hrs
		0	0	4	-	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

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SYLLABUS

SEMESTER - IV

P20MCT401	OFFICE AUTOMATION AND MODERN TOOLS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To know about the overview of MS-OFFICE
- To study about the MS-WORD and document setting
- To understand about the Mail merge and table settings
- To get knowledge in MS-Excel and Manipulation
- To get adequate knowledge in Power Point Presentation

Course Outcomes

On successful completion of the course students will be able to:

CO1 - Understand about the Word Document. **(K1)**

CO2 - Create document and design format. **(K2)**

CO3 - Identify the Mail merge and spell check of the document. **(K2)**

CO4 - Develop Spreadsheet and create multiple worksheets. **(K2)**

CO5 - Show how to prepare the presentation with animation. **(K2)**

UNIT – I MS OFFICE **(9 Hrs)**

Introduction to MS Office - MS Word : - Working with Documents -Opening & Saving files, Formatting page & setting Margins, Converting files formats, Importing & Exporting documents-Tool bars- Formatting Documents - Setting Font styles-Setting Paragraph style-Setting Page style - Formatting Page, Header & footer, Setting Footnotes & end notes – Inserting manual page break-Setting Document styles-Creating Master Documents-creating Web page- Creating Tables- Table settings, Drawing - Inserting ClipArts, Pictures/Files etc., Tools – Word Completion, Spell Checks- Short cut keys.

UNIT II E-MAIL **(9 Hrs)**

Mail merge, Templates, Creating contents for books, Creating Letter/Faxes, Send E-Mail – Publish-Creating Web pages, Using Wizards, Tracking Changes, Security, Digital Signature. Printing Documents – Shortcut keys-Concepts of Review – View of Document – AddIns – Create PDF file – Create Customs tool Bars – Introduction to macro - Shortcut Keys-Printing Settings – Print Document.

UNIT – III MS EXCEL **(9 Hrs)**

Introduction to MS Excel : Spread Sheet & its Applications-Opening Spreadsheet-Menus - main menu, Formula Editing-Formatting-Toolbars-Spreadsheet types. Working with Spreadsheets and Manipulation-Page Style-File conversion format-File Manipulation – Importing-exporting- Entering - Deleting Data – Data Font Settings - Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files.

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UNIT – IV BUILT IN FUNCTION **(9 Hrs)**

Introduction to Built In Function - Mathematical – Financial – Logical - Text – Date & Time function - Mathematical operations- Formatting Spreadsheets- Labelling – Cell Format – Alignment Formatting layout for Graphics, Worksheet Style-Security-Customization-Spreadsheet Insert Process - Pivot Tables - Tables – Picture – Cliart – Shapes – Smart Art – Graph – Hyper Link – Data Sorting, Filtering, Validation, Consolidation, and Subtotal. Creating Charts - Drawing. Printing. Using Tools –Spell Checks, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Introduction to macro.

UNIT – V MS POWER POINT **(9 Hrs)**

MS Power point: Introduction to presentation – Presentation Menu - Opening new presentation-Presentation templates- backgrounds Settings - Presentation layouts. Creating a presentation - Presentation style setting , Adding text,Style,Color,Fill to the Presentation. Presentation Format - Slide layout. Insert Processing - Add Graphics - Inserting pictures, movies, tables,Graphs,Images. Adding Effects to the Presentation- Setting Animation & transition- Presentation view- Slide show methods . Printing Handouts – Add Ins.

Text Books

1. Microsoft Office 2007 Bible - John Walkenbach, HerbTyson, FaitheWempen, caryN.Prague, MichaelR.groh, PeterG.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
2. Shelly Cashman Series Microsoft Office 365 & Office 2019,Sandra Cable, Steven M. Freund, Ellen Monk, Susan L. Sebok, Joy L. Starks,Cengage Learning Publications

Reference Books

1. Microsoft Office 365 In Practice, 2019 Edition, SIMnet,McGraw-Hill Education
2. Ms Office Professional 2010 Step by Step,Cox (English, Paperback, Cox), Prentice-Hall of India Pvt.Ltd,2018

Web Resource

1. http://windows.microsoft.com/en-in/windows/windows-basics-all-topics
2. https://en.wikipedia.org

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	3	-	-	-	2	1	3	2	2	2	1
CO2	3	2	3	3	2	-	-	-	2	1	2	3	3	2	3
CO3	3	3	2	3	3	-	-	-	2	1	3	2	3	3	3
CO4	3	3	3	2	3	-	-	-	2	1	2	3	3	3	3
CO5	3	2	3	2	2	-	-	-	2	1	3	2	3	3	3

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P20MCP401	OFFICE AUTOMATION TOOLS LAB	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives

- To understand the basic concepts of Office Automation Tools
- To understand concepts in MS-OFFICE.
- To learn about Editor process of MS-WORD.
- To learn about file Spread sheet handling and presentation.
- To develop a Presentation concepts.

Course Outcomes

After completion of the course, the students should be able to:

CO1 - To know about the automation tools.

CO2 – To gain knowledge in Editor software

CO4 - To acquire knowledge on Mail merge concepts

CO4 - To acquire knowledge spread sheet and presentation software.

CO5 - To apply presentation technique in the ppt.

List of Exercise

MS-WORD

1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text
2. Bio data: Prepare a Bio-data, Mini Document Preparation.
3. Find and Replace: Write a paragraph about yourself and do the following. Find and Replace - Use Numbering Bullets, Footer and Headers.
4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows). Create a mark sheet.
5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

MS-EXCEL

1. Data Sorting-Ascending and Descending (both numbers and alphabets)
2. Mark list preparation for a student
3. Individual Pay Bill preparation.
4. Invoice Report preparation.
5. Drawing Graphs. Take your own table.

MS-POWERPOINT

1. Create a slide show presentation for a seminar.
2. Preparation of Organization Charts

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3. Create a slide show presentation to display the percentage of marks in each semester for all students
4. Use different presentation template different transition effect for each slide.

Reference Books

1. Microsoft Office 365 & Office 20119 Introductory, Sandra Cable, Steven,David Beskeen, M.Fredud, 2019
2. Introduction to Information Technology, ITL, Education Solutions limited, Pearson Educations.
3. Microsoft Office 2019 Inside Out. Joe Habraken -2019

Web Resources

1. https://www.microsoft.com
2. https://support.microsoft.com
3. https://edu.gcfglobal.org
4. https://www.skillshare.com

COs-POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	2	-	-	-	-	-	1	-	-	3	1	-
CO2	3	3	-	2	-	-	-	-	-	1	-	-	3	1	-
CO3	3	3	-	2	-	-	-	-	-	1	-	-	3	1	-
CO4	-	2	2	3	2	-	-	-	-	-	-	-	3	3	-
CO5	3	2	3	-	3	-	-	-	-	1	-	2	3	3	-

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P20MCP402	TECHNICAL SEMINAR AND REPORT WRITING	L	T	P	C	Hrs
		0	0	4	2	45

Course Objectives

To learn the about the seminar pattern content.

To learn about the concepts of Recent technology.

To study about the report writing concepts.

To know the effective presentation technique

To know the effective report writing and presentation

Course Outcomes

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

CO1- Use and get knowledge in the field of Programming and Technical topics

CO2- Identify, understand and discuss the recent trends, challenges and issues

CO3- Improve the skills in oral and written communication.

CO4- Identify the technology and writing methodology

CO5- Apply the presentation and Report/document writing.

List of Exercise

1. Introduction to Seminar and Seminar Topic
2. Method of Communication and Correspondence
3. Electronic Communication: Internet, Intranet, extranet, Writing effective e-mail.:
4. Report Strategies: Effective style of technical report writing: Structures: content, introduction, conclusions,references, etc., Presentation, Writing first draft, revising first draft, diagrams, graphs, tables, etc.
5. Introduction Technical Writing and methodology:
6. Report Writing: Criteria for report writing
7. Types of Report: Trip report, Progress report, lab report, Feasibility report, project report, incident report, etc. Case Studies.
8. Preparation and Presentation : Title page, Cover letter, Table of Content, list of illustrations, summary, discussion,conclusion, references, glossary, appendix, Case Studies.
9. Oral Presentation/ Seminar: Power Point presentation Preparation, Oral Presentation

Reference Books

1. 1. Sharon J. Gerson & Steven M. Gerson “Technical Writing – Process& Product”, Pearson Education-2013.
2. 2. Davies J.W. “Communication for engineering students”, Longman - 2009
3. 3. Eisenberg, “Effective Technical Communication”, Mc. Graw Hill- 2006

Web Resources

1. https://www.inspirenignite.com/
2. https://medium.com/technical-writing-is-easy
3. https://students.unimelb.edu.au/academic-skills

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COs-POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	2	-	-	-	-	-	1	-	-	2	2	-
CO2	3	-	2	2	-	-	-	-	-	1	-	-	2	2	-
CO3	2	-	1	-	1	-	-	-	-	1	-	-	2	2	1
CO4	1	-	1	-	1	-	-	-	-	-	-	-	1	1	1
CO5	1	-	1	-	1	-	-	-	-	1	-	2	1	1	1

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P20MCW403	PROJECT WORK AND VIVA-VOCE	L	T	P	C	Hrs
		0	0	0	12	-

Course Objectives

- The students are expected to complete the project work and to submit a full-fledged project report and attend the viva-voce.

Course Outcomes

On successful completion of this Project Work, the students will be able to:

CO1 - Master a programming language or software tool used for implementation. (K1)
CO2 - Test the project and compare it with benchmark standards. (K1)
CO3 - Prepare the Project Report. (K2)
CO4 - Develop the presentation skills. (K3)
CO5 - Develop a real time applications software. (K3)

Project Work Assessment Modules

1. Students has to approach the industiries / insitutions to to do project work.
2. Project confirmation report to be submitted to the respective guide.
3. Reviews will be conducted regularly in the department and marks will be recorded.
4. The project work will be published in a Reputed journals.
5. Viva-voce will be conducted.

Reference Books

1. Books related to the Project Title.
2. Papers published in Reputed Journals/Conferences related to the Project Title

COs-POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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CO2	3	-	2	2	-	-	-	-	-	1	-	-	2	2	-
CO3	2	-	1	-	1	-	-	-	-	1	-	-	2	2	1
CO4	1	-	1	-	1	-	-	-	-	-	-	-	1	1	1
CO5	1	-	1	-	1	-	-	-	-	1	-	2	1	1	1

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CERTIFICATE COURSES-IV

P20MCC4XX	CERTIFICATE COURSE-IV	L	T	P	C	Hrs
		0	0	4	-	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

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PROFESSIONAL ELECTIVE COURSES

Professional Elective–1: Web Services and Technologies (Offered in Semester II)

P20MCE201	REST API	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- Understanding the basics of REST API
- A better understanding of database concepts
- Use open-source API like maps, data, images, news, etc.
- Create your REST API endpoints for your project.
- Use your own endpoints from multiple projects.

Course Outcome

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

CO1 - State the uses and application of REST API. **(K1)**

CO2 - Describe the Components of web services. **(K1)**

CO3 - Implementation of HTTP protocols. **(K3)**

CO4 - Explain the resources for REST API. **(K1)**

CO5 - Discuss the Security parameters in REST API. **(K2)**

UNIT I REST API **(9 Hrs)**

REST API -Introduction

UNIT II WEB SERVICES **\ (9 Hrs)**

Web services, Web API Protocol - Web Service Layer, Formatting Layer, XML, and JSON.

UNIT III HTTP **(9 Hrs)**

HTTP Request (Path parameters, Query parameters, Header parameters), HTTP Response, HTTP Methods, HTTP Response Codes

UNIT IV RESOURCES **(9 Hrs)**

What is REST API, REST API Features, Architectural Constraints, RESTAPI. Resources & Representations, REST Resource Naming Guide, REST API Versioning, Caching, Compression, Content Negotiation,

UNIT V SECURITY **(9 Hrs)**

REST API Security, HTTPS, Use Password Hash, HTTP Authentication, API keys, OAuth 2.0 REST API Design, Identify Object Model, Create Model URIs, Determine Representations, Assign HTTP Methods, Creating API, Developer friendly API, Securing API, Send API Requests, parsing response, Accessing Publised API

Text Books

1. REST APIs with Django: Build powerful web APIs with Python and DjangoWilliam S. Vincent June 15, 2018, Independently published
2. REST API Design Rulebook: Designing Consistent RESTful Web Service Interfaces Kindle Edition, Mark Masse,O'Reilly Media; 1 edition (18 October 2011)

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Reference Books

1. REST API Design Control & Management: DevOp Series Kindle Edition, Alasdair Gilchrist RG Consulting (17 September 2015)
2. Automating and Testing a REST API, Alan Richardson,Compendium Developments Ltd; 1 edition (July 4, 2017)

Web Reference

1. https://www.edureka.co/blog/what-is-rest-api/
2. https://www.tutorialspoint.com/rest_api/index.asp
3. https://restfulapi.net/rest-api-design-tutorial-with-example/
4. https://www.guru99.com/restful-web-services.html
5. https://www.udemy.com/topic/rest-api/
6. https://www.freecodecamp.org/news/rest-api-tutorial-rest-client-rest-service-and-api-calls-explained-with-code-examples/
7. https://spring.io/guides/tutorials/rest/
8. https://www.lynda.com/REST-training-tutorials/1717-0.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	3	1	-	-	2	3	-	-	-	-	-	-	-	-	1
CO3	3	1	-	-	-	3	-	-	-	-	-	-	-	-	-
CO4	3	1	2	-	-	3	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	2	3	-	-	-	-	-	-	-	-	1

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P20MCE202	WEB TECHNOLOGY AND ITS APPLICATIONS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- Introduction to client and server sides of web development.
- Students learn how to create web pages using HTML, XHTML, XML, and CSS.
- Students also will gain exposure to scripting languages such as JavaScript and PHP.
- In addition, they will learn how to embed images and multimedia and use proprietary media and interacting with other technologies such as Flash, ActiveX, and QuickTime.
- Create forms: create HTML5 forms that include validation.

Course Outcomes

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

CO1 - Describing the core architecture of WWW as interconnected hypertext documents. **(K1)**

CO2 – Discuss the Web applications using HTML, CSS, JavaScript and PHP. **(K2)**

CO3 – Compare various security methods for security and privacy. **(K2)**

CO4 – Recognize the different streaming file formats. **(K2)**

CO5 – Discuss how to work with the web service environment. **(K2)**

UNIT I WEB TECHNOLOGIES AND INFORMATION ARCHITECTURE **(9 Hrs)**

HTTP protocol - Web mark-up and display languages - Web services - Web servers, standards - hypertext/hypermedia - navigation schemes - Web design process - usability - digital libraries - media formats - streaming media

UNIT II WEB DESIGN MEDIA AND WEB DEVELOPMENT **(9 Hrs)**

Digital libraries- media formats- streaming media- interfaces and Web site implementation and integration- accessibility issues -Client-side and server-side programming: XHTML – CSS – Flash – cookies – CGI – JavaScript - PHP programming

UNIT III WEB SYSTEMS SECURITY AND VULNERABILITIES **(9 Hrs)**

Web server – proxy – Cookies – Sessions –Authentications - cache concepts – installation – operation and administration- client security - server security - phishing

UNIT IV STREAMING MEDIA FILE FORMATS **(9 Hrs)**

Streaming media file formats – compression - color depth -bit rate - CODECs

UNIT V WEB SERVICES **(9 Hrs)**

Overview of www - web pages - web sites - web applications - TCP/IP - TCP/IP application - web services - web servers - wamp configurations.

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Text Book

1. Randy Connolly & Ricardo Hoar, Fundamentals of Web Development, 2nd Ed. Pearson, Copyright 2017, ISBN-10: 0134481267, ISBN-13: 9780134481265

Reference Books

1. DanWoods and GautamGuliani,"Open Source for the Enterprise: Managing Risks, Reaping Rewards", O'Reilly, Shroff Publishers and Distributors, 2005.
2. Sebesta,"Programming world wide web" Pearson.
3. Dietel and Nieto,"Internet and World Wide Web – How to program",PHI/Pearson Education Asia.
4. Murach,"Murach's beginning JAVA JDK 5", SPD
5. Wang,"An Introduction to web Design and Programming"

Web Reference

1. http://codoplex.weebly.com/web-systems-technologies.html
2. https://www.w3schools.com/
3. https://nptel.ac.in/courses/106/106/106106156/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	3	-	2	-	1	3	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	3	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	3	-	-	-	-	-	-	2	-	-
CO5	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-

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P20MCE203	WEB SERVICES	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To understand the advantages of using XML technology family
- To analyze the problems associated with tightly coupled distributed software architecture
- To learn the Web services building block
- To Understand XML concepts and the SOA, its Principles and Benefits.
- To understand paradigms needed for testing Web Services Test Strategies for SOA-based applications

Course Outcomes

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

CO1 - State the benefits and advantages XML family. **(K1)**

CO2 – Discuss web service architecture (**K2)**

CO3 – Classify the web service components. **(K2)**

CO4 – Implementing web service solutions using XML principles. **(K3)**

CO5 – Describe how content management implemented in XML. **(K2)**

UNIT I XML TECHNOLOGY FAMILY **(9 Hrs)**

XML – benefits – Advantages of XML over HTML, EDI, Databases – XML based standards – Structuring with schemas - DTD – XML Schemas – XML processing – DOM – SAX – presentation technologies – XSL – XFORMS – XHTML – Transformation – XSLT – XLINK – XPATH – XQuery.

UNIT II ARCHITECTING WEB SERVICES **(9Hrs)**

Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service-oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime

UNIT III WEB SERVICES BUILDING BLOCKS **(9Hrs)**

Transport protocols for web services – messaging with web services - protocols - SOAP - describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad-Hoc Discovery - Securing web services.

UNIT IV IMPLEMENTING XML IN E-BUSINESS **(9Hrs)**

B2B – B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – Rosetta Net - Applied XML in vertical industry – web services for mobile devices.

UNIT V XML CONTENT MANAGEMENT AND SECURITY **(9Hrs)**

Semantic Web – Role of Meta data in web content - Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG – WSFL – Securing web services.

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Text Book

1. Ron Schmelzer et al. " XML and Web Services", Pearson Education, 2002.

References Books

1. Keith Ballinger, ". NET Web Services Architecture and Implementation", Pearson Education, 2003.
2. David Chappell, "Understanding .NET A Tutorial and Analysis", Addison Wesley, 2002.
3. Kennard Scibner and Mark C.Stiver, " Understanding SOAP", SAMS publishing.
4. Alexander Nakhimovsky and Tom Myers, "XML Programming: Web Applications and Web Services with JSP and ASP", Apress, 2002.

Web Resources

1. https://www.tutorialspoint.com/webservices/index.htm
2. https://www.udemy.com/course/web-services-api-step-by-step-beginner-tutorial/
3. https://www.guru99.com/web-services-tutorial.html
4. https://www.javatpoint.com/web-services-tutorial
5. https://nareshit.in/web-services-training/
6. https://www.intertech.com/training/java/java-ee/web-services
7. https://www.w3schools.com/xml/xml_services.asp

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CO2	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	3	-	-	-	-	-	-	-	-	-
CO5	3	1	2	-	2	3	-	-	-	-	-	-	0	-	-

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P20MCE204	XML AND APPLICATIONS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- Expose the students to the XML family of technologies, and the latest W3C and WS-I XML standards AND various applications of XML.
- Expose the students to the combined use of XML and Java technologies to support the development of modern applications.
- Expose the students to the advanced XML-enabled capabilities of the Java 2 development environment for Enterprise Applications.
- Demonstrate the use of XML to support the modern approach at building comprehensive business applications and testing methodologies and tools.

Course Outcomes

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

CO1 – Define and learn the basics of creating XML documents and elements. **(K1)**

CO2 – Describe the structure of XML documents. **(K2)**

CO3 - Discuss the application of XQUERY in XML. **(K2**)

CO4 - Explain the application of XML style sheets. **(K2)**

CO5 -. Recognize the need of XForms: in XML Forms. **(K2)**

UNIT I XML **(9 Hrs)**

Introduction and need of XML, Extending and Adopting Markup Languages from SGML to XML and HTML, benefits and Drawbacks of XML, representing mixed data and context with XML. Creating an XML Document, Defining Structure, Rules for Well-Formed and Valid XML, Changing XML Documents XML Syntax: Tag Attributes and Naming Rules, Empty and Non-Empty Elements, Processing Instructions for XML, Accessing Data from XML Elements. XML Namespaces: Need of XML Namespaces, Prefixes and Declarations, Default and Multiple Namespaces.

UNIT II XML SCHEMA **(9 Hrs)**

XML Document Type Definition (DTD), XML DTD as an XML Schema, creating a DTD, Element Conditions and Quantifiers, Referencing DTD Declarations, Validating DTD Compliance, XML Schema Definition (XSD): Element and Attribute Declarations, Simple, Complex, and Built-in Types Named and Anonymous Types, Associating XML with a Schema, Validating XSD Compliance

UNIT III XQUERY **(9 Hrs)**

XQuery and XPath: Need of XQuery and XPath, XPath Nodes and Syntax, Seven Node Types, Node Paths and Predicates, Node Axes and Functions, XQuery Structure and Usage, XPath and XSD in XQuery, Terms and Syntax, Selecting and Filtering Elements. Publishing XML: Stylesheet Languages, Using Style Sheets with XML, Page Layout with Cascading Style Sheets (CSS), CSS Syntax and Classes.

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UNIT IV XSLT **(9 Hrs)**

Introduction to XSL and XSLT, XSLT transformations, XSLT Elements: template, valueof, for-each, sort, if, choose, when, apply, attribute, copy, import, include, key, number, output, param, sort, stylesheet, template, text, transform, variable, XSLT Functions: current, document, element available, format-number, function available, generate-id, key.

UNIT V XFORMS **(9 Hrs)**

XForms: Need of XML Forms, XForms Structure and Syntax, Selecting and Controlling XForms Input. XML Document Object Model (DOM) : Introduction to DOM, node, node tree, node properties, methods, node list, DOM parser, accessing node, traversing nodes, load function, Manipulating nodes: get values, change node, remove node, replace node, create node, add nodes, clone nodes.

Text Books

1. Beginning XML, David Hunter, Jeff Rafter, Joe Fawcett, Wiley India Pvt. Ltd., Fourth Edition.
2. The Complete Reference XML, Heather Williamson, TMH

Web Resources

1. https://www.w3schools.com/xml/
2. https://www.w3schools.com/xml/xml_whatis.asp
3. https://www.tutorialspoint.com/xml/index.htm
4. https://www.javatpoint.com/xml-tutorial
5. https://www.ed.youth4work.com/course/126-xml-online-course
6. https://www.webucator.com/tutorial/learn-xml/xml-basics.cfm

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO3	3	-	1	-	1	2	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-

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P20MCE205	SERVICE ORIENTED ARCHITECTURE	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To know about the Cloud Computing architecture and services SOAP, UDDI and XML to create web services.
- To provide fundamental concepts of Service Oriented Architecture.
- To review several issues in the business adoption of SOA in an IT context;
- To give an understanding of the several definitions of SOA (as an architectural style, as an IT paradigm,
- To review major standards in WSDL-*, together with SOAP and REST concepts;

Course Outcomes

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

CO 1: State the basic principles of service oriented architecture, its components and techniques. **(K1)**

CO 2: Describe the architecture of web services **(K2)**

CO 3: Discuss technology underlying the service design. **(K2)**

CO 4: Explain the protocols used to design and develop web services. **(K2)**

CO 5: Memorize the fundamental knowledge of cloud computing **(K1)**

UNIT I SOA BASICS **(9 Hrs)**

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation – Service Layers.

UNIT II XML AND WEB SERVICES **(9 Hrs)**

XML structure – Elements – Creating Well-formed XML - Name Spaces – Schema Elements, Types, Attributes – XSL Transformations – Parser – Web Services Overview – Architecture.

UNIT III WSDL, SOAP and UDDI 9 **(9 Hrs)**

WSDL - Overview Of SOAP – HTTP – XML-RPC – SOAP: Protocol – Message Structure – Intermediaries – Actors – Design Patterns And Faults – SOAP With Attachments – UDDI.

UNIT IV SOA in J2EE and .NET **(9 Hrs)**

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC) – JAX-RS SOA support in .NET – ASP.NET web services.

UNIT V CLOUD COMPUTING **(9 Hrs)**

Vision of Cloud computing – Cloud Definition – Characteristics and Benefits – Virtualization – Cloud computing Architecture – Cloud Reference Model, Types of Clouds – Cloud Platforms in Industry.

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References Books

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2006.
2. Heather Williamson, “XML, The Complete Reference”, McGraw Hill Education, 2012.
3. Frank. P. Coyle, “XML, Web Services And The Data Revolution”, Pearson Education, 2002.
4. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services. An Architect’s Guide”, Pearson Education, 2005.
5. Newcomer, Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005.
6. Dan woods and Thomas Mattern, “Enterprise SOA designing IT for Business Innovation”, O’REILLY, First Edition, 2006.
7. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, “Mastering Cloud Computing”, McGraw Hill Education, 2013.

Web References

1. https://www.tutorialspoint.com/soa/index.htm
2. https://www.coursera.org/learn/service-oriented-architecture
3. https://www.javatpoint.com/service-oriented-architecture

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO4	3	1	1	-	1	3	-	-	-	-	-	-	-	1	-
CO5	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-

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Professional Elective–2: Big Data
(Offered in Semester III)

P20MCE301	DATA SCIENCE IN BIG DATA	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To learn the fundamentals of data Science and big data
- To gain in-depth knowledge on descriptive data analytical techniques
- To equip students with knowledge to implement simple to complex analytical algorithms in big data frameworks
- To develop programming skills using libraries and packages required to perform data analysis.
- To understand and apply the data visualization, web scraping, machine learning and natural language processing using Python.

Course Outcomes

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

CO1 - Learn the types and classifcations of Bigdata. **(K1)**
CO2 - Learn the steps of data preparation, Data reduction and Data Representation. **(**K**2)**
CO3 - Learn about supervised and unsupervised learning. **(K2)**
CO4 - Analyse the different analytical frameworks. **(K3)**
CO5 – Analyse the various packages and advanced data representations using python. **(K3)**

UNIT I - INTRODUCTION TO DATASCIENCE AND BIG DATA (9Hrs)

Data Science - Fundamentals and Components – Data Scientist – Terminologies Used in Big Data Environments - Types of Digital Data - Classification of Digital Data - Introduction to Big Data - Characteristics of Data - Evolution of Big Data - Big Data Analytics - Classification of Analytics.

UNIT II - DESCRIPTIVE ANALYTICS USING STATISTICS (9Hrs)

Types of Data – Mean, Median and Mode – Standard Deviation and Variance – Probability – Probability Density Function – Types of Data Distribution – Percentiles and Moments – Correlation and Covariance – Conditional Probability – Bayes Theorem – Introduction to Univariate, Bivariate and Multivariate Analysis.

UNIT III - PREDICTIVE MODELING AND MACHINE LEARNING (9Hrs)

Linear Regression – Polynomial Regression – Multivariate Regression – Multi Level Models – Data warehousing overview – Bias / variance trade off – K Fold cross validation – Data Cleaning and Normalization – Cleaning web log Data – Normalizing numerical Data – Detecting Outliers – Introduction to Supervised and Unsupervised learning.

UNIT IV - DATA ANALYTICAL FRAMEWORKS (9Hrs)

Introducing Hadoop: - Hadoop Overview - RDBMS versus Hadoop - HDFS (Hadoop Distributed File System): Components and block replication – Processing Data with Hadoop - Introduction to MapReduce – Features of MapReduce – Introduction to NoSQL: CAP theorem, MongoDB.

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UNIT V - DATA SCIENCE USING PYTHON (9Hrs)

Introduction to essential data science packages: NumPy, SciPy, Jupyter, Statsmodels and pandas Package – Introduction to Data Munging, Data pipeline and Machine learning in Python - Data visualization using matplotlib – Interactive visualization with advanced data learning representation in Python.

Text Books

1. Frank Pane, Hands On Data Science and Python Machine Learning, Packt Publishers, 2017
2. Seema Acharya and SubhashiniChellapan, Big Data and Analytics, Wiley, 2015.

Reference Books

1. Alberto Boschetti and Luca Massaron, Python Data Science Essentials, Packt Publications, 2nd Edition, 2016.
2. DT Editorial Services, Big Data, Black Book, Dream Tech Press, 2015.
3. Yuxi (Hayden) Liu, Python Machine Learning, Packt Publication, 2017.

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1. https://onlinecourses.nptel.ac.in/noc20_cs92
2. https://www.coursera.org/lecture/code-free-data-science/introduction-to-data-mining-hbb2V
3. https://www.ngdata.com/data-mining-resources/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	1	1	1	1	2	1	-	-	2	3	3
CO2	2	3	3	2	1	1	-	1	2	1	1	-	2	2	3
CO3	2	-	-	2	1	-	-	1	2	1	2	-	2	3	3
CO4	2	3	3	2	1	-	-	1	2	1	1	-	2	2	-
CO5	2	3	3	2	1	2	2	1	2	1	1	-	2	2	-

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P20MCE302	BIG DATA ANALYTICS AND APPLICATIONS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.

Course Outcomes

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

CO1 - Work with big data tools and its analysis techniques. **(K1)**

CO2 - Analyze data by utilizing clustering and classification algorithms. **(K2)**

CO3 - Learn and apply different mining algorithms and recommendation systems for large volumes of data **(K2)**

CO4 - Perform analytics on data streams. **(K3)**

CO5 - Learn No SQL databases and management. **(K3)**

UNIT I INTRODUCTION TO BIG DATA (9 Hrs)

Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of High-Performance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model.

UNIT II CLUSTERING AND CLASSIFICATION (9 Hrs)

Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes‘ Theorem - Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM (9 Hrs)

Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT - IV NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION (9 Hrs)

NoSQL Databases : Schema-less Modelsǁ: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding –- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs- Review of Basic Data Analytic Methods using R.

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UNIT - V SOCIAL MEDIA ANALYTICS **(9 Hrs)**

Facebook Analytics: Introduction, parameters, demographics. Analyzing page audience. Reach and Engagement analysis. Post- performance on FB. Social campaigns. Measuring and Analyzing social campaigns, defining goals and evaluating outcomes, Network Analysis (LinkedIn, Instagram, YouTube Twitter etc.)

Text Books

1. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.
3. Matthew Ganis, Avinash Kohirkar, Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media, Pearson, 2016

Reference Books

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. DietmarJannach and Markus Zanker, "RecommenderSystems: An Introduction", Cambridge University Press,2010.
4. Marshall Sponder, Social Media Analytics, McGraw Hill, Latest edition.

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1. https://www.guru99.com/bigdata-tutorials.html
2. https://www.edureka.co/blog/big-data-tutorial

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	1	-	-	-	2	1	1	-	2	3	3
CO2	2	-	-	2	1	-	-	-	2	1	2	-	2	2	3
CO3	2	3	3	2	1	-		-	2	1	2	-	2	3	-
CO4	2	3	3	2	1	-	-	-	2	1	2	-	2	2	-
CO5	2	3	3	2	1	-	-	-	2	1	1	-	2	2	3

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P20MCE303	ARTIFICIAL INTELLIGENCE AND DEEP LEARNING	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- Introduce major deep learning algorithms,
- The problem settings, and their applications
- To solve real world problems.

Course Outcomes

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

CO1 - Understand the fundamentals of Artificial Intelligence. **(K1)**

CO2 - Learn the basics of neural networks and deep learning **(K2)**

CO3 - Design and implement neural network systems. **(K3)**

CO4 - Identify new application requirements in the field of computer vision **(K3).**

CO5- Design the auto coder.**(K3)**

UNIT I INTRODUCTION TO AI AND PROBLEM SOLVING (9 Hrs)

Introduction - Foundations of Artificial Intelligence – History of Artificial Intelligence – AI Agents and its structure - Problem solving by searching– Uninformed Search Strategies – Breadth first search - Depth-first search - Depth-limited search - Iterative deepening depth-first search - Bidirectional search, Informed(Heuristic) Search Strategies - Greedy best-first search - A* search - Memory-bounded heuristic search.

UNIT II NEURAL NETWORKS BASICS (9 Hrs)

Image Fundamentals –Feed forward Neural networks - Gradient descent and the back propagation algorithm - Weight initialization - Activation Functions –Regularization - Dropout Batch Normalization -Performance metrics analysis - Deep Learning libraries: Tensroflow – Keras - Pytorch – Caffe - Google Colab platform hands on experience.

UNIT III CONVOLUTIONAL NEURAL NETWORKS (9 Hrs)

Architectures - convolution / pooling layers - State of the art CNN architectures: VGG – Res Net –GoogleNet – Xception - MobileNet - DenseNet -CNN Pretrained Models with Image Net weights -Transfer learning Techniques - Under fitting and Over fitting - Data Augmentation: A technique to avoid over fitting.

UNIT IV APPLICATIONS OF DEEP LEARNING TO COMPUTER VISION (9 Hrs)

Object Detection Annotation Tools: Labeling - VGG Image Annotator tool - Object Detection deep learning architectures: Faster RCNN – SSD - Yolo. Semantic Segmentation deep learning architectures: SegNet – Unet - Instance Segmentation: Mask RCNN - Automatic image captioning -Image generation with Generative adversarial networks.

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UNIT IV SEQUENCE MODELS **(9 Hrs)**

Recurrent Neural Network Model – Back propagation through time - Different types of RNNs - Long Short-Term Memory (LSTM) - Gated Recurrent Unit (GRU) - Natural Language Processing & Word Embeddings - Word Representation -Word2Vec –GloVe - word vectors - Sentiment Classification -Attention Model - named entity recognition - speech recognition.

Text Books

1. Stuart Russel, Peter Norvig "Artificial Intelligence – A Modern Approach", 3rd Edition, Pearson Education 2009.
2. Deep Learning An MIT Press book Ian Good fellow and Yoshua Bengio and Aaron Courville 2016
3. Neural Networks and Deep Learning by Michael Nielsen.

Reference Books

1. M. Tim Jones, Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc; 1 edition, 2008 .
2. The Elements of Statistical Learning, by Trevor Hastie, Robert Tibshirani, and Jerome Friedman 12th edition 2017
3. Adam Gibson and Josh Patterson's Deep Learning: A Practitioners Approach

Web References

1. https://www.youtube.com/channel/UCF9O8Vj-FEbRDA5DcDGz-Pg/videos

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	1	-	-	1	2	1	1	1	2	3	3
CO2	2	3	3	2	1	-	-	1	2	1	1	2	2	2	3
CO3	2	-	-	2	1	-	1	1	2	1	1	-	2	3	-
CO4	2	3	3	2	1	-	-	-	2	1	2	-	2	2	-
CO5	2	3	3	2	1	-	-	-	2	1	2	-	2	2	3

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P20MCE304	CLOUD COMPUTING AND BIG DATA	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To define the fundamental ideas behind Cloud Computing.
- To classify the basic ideas and principles in cloud information system.
- To relate cloud storage technologies and relevant distributed file systems
- To understand the Big Data Platform and its Use cases
- To provide an overview of Apache Hadoop, Provide HDFS Concepts and Interfacing with HDFS

Course Outcomes

After completion of the course, the students should be able to:

CO1 – Learn the core concepts of the cloud computing paradigm (K1)

CO2 – StuLdents will learn the fundamental concepts in cloud infrastructures. (K2)

CO3 - Know the fundamental concepts of cloud storage system such as Amazon S3 and HDFS. (K3)

CO4 - Design the applications in Big Data and its Business Implications. (K3)

CO5- Learn the Hadoop and Hadoop Eco-System,Access and Process Data on Distributed File System. (K3)

UNIT I INTRODUCTION (9 Hrs)

Introduction to Cloud Computing- The Evolution of Cloud Computing – Hardware Evolution – Internet Software Evolution – Server Virtualization - Web Services Deliver from the Cloud – Communication-as-a-Service – Infrastructure-as-a-Service – Monitoring-as-a-Service – Platform-as-a-Service – Software-as-a-Service – Building Cloud Network.

UNIT II CLOUD INFORMATION SYSTEMS (9 Hrs)

Federation in the Cloud - Presence in the Cloud - Privacy and its Relation to Cloud-Based Information Systems – Security in the Cloud - Common Standards in the Cloud – End-User Access to the Cloud Computing.

UNITIII CLOUD INFRASTRUCTURE (9 Hrs)

Introduction - Advancing towards a Utility Model – Evolving IT infrastructure – Evolving Software Applications – Continuum of Utilities- Standards and Working Groups - Standards Bodies and Working Groups – Service Oriented Architecture – Business Process Execution Language – Interoperability Standards for Data Center Management - Utility Computing Technology – Virtualization – Hyper Threading – Blade Servers - Automated Provisioning - Policy Based Automation – Application Management – Evaluating Utility Management Technology - Virtual Test and development Environment - Data Center Challenges and Solutions - Automating the Data Center

UNIT IV INTRODUCTION TO BIG DATA AND HADOOP (9 Hrs)

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to InfosphereBigInsights and Big Sheets.

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UNIT V HDFS(HADOOP DISTRIBUTED FILE SYSTEM) & MAP REDUCE (9 Hrs)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures. Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

Text Books

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Ritting house, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
3. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.

Reference Books

1. John W. Rittinghouse and james F. Ransome, "Cloud Computing Implementation, Management and Security", 2010, CRC Press, Taylor & Francis Group, Boca Raton London New York. [Unit -11 and Unit II]
2. Alfredo Mendoza, "Utility Computing Technologies, Standards, and Strategies", Artech House INC, 2007. [Unit -11I to Unit V]
3. Bunker and Darren Thomson, "Delivering Utility Computing", 2006, John Wiley & Sons Ltd.
4. Pete Warden, "Big Data Glossary", O'Reily, 2011.

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1. www.coltdatacentres.net/Cloud Technology.
2. https://www.zdnet.com/article/what-is-cloud-computing-everything-you-need-to-know-about-the-cloud/
3. www.digitalocean.com/community/tutorials/an-introduction-to-big-data-concepts-and-terminolog

COs/POs/PSOs Mapping

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CO1	3	1	1	1	1	1	1	-	2	1	3	-	2	1	1
CO2	3	2	2	2	-	3	2	-	2	1	-	-	2	1	3
CO3	3	2	-	3	-	2	3	-	2	1	-	-	3	2	3
CO4	3	3	-	2	2	3	2	-	2	1	3	1	2	3	-
CO5	3	3	3	2	2	2	2	-	2	1	2	1	3	2	-

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P20MCE305	BIG DATA TOOLS AND TECHNIQUES	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- Understand the Big Data Platform and tools.
- Provide an overview of MapReduce.
- Give an idea to develop application based on MapReduce.
- Understand Map Reduce Jobs and Provide hands on Hodoop Eco System
- Apply analytics on Structured, Unstructured Data and Exposure to Data Analytics with R.

Course Outcomes

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

CO1: Understand the Big Data, Hadoop its Business Implications. **(K1)**

CO2: Learn the Mapreduc types, formats and features. **(K2)**

CO3: Design and develop a Mapreduce applications. **(K3)**

CO4: Develop Big Data Solutions using Hadoop Eco System. **(K3)**

CO5: Apply Machine Learning Techniques using R. **(K4)**

UNIT I : INTRODUCTION TO BIG DATA AND HADOOP (9Hrs)

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to InfosphereBigInsights and Big Sheets.

UNIT II : MAP REDUCE (9Hrs)

Anatomy of a MapReduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT III : DEVELOPING A MAPREDUCE APPLICATION

The Configuration API-settingup the development environment-Writing Unit Test with MRunit- Running locality on Test Data- Running on a Cluster-Tunning a Job-MapReduce workflows.

UNIT IV : HADOOP ECO SYSTEM (9Hrs)

Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.**Hive** : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. **Hbase :**HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. **Big SQL** : Introduction

UNIT V : DATA ANALYTICS WITH R (9Hrs)

Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

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Text Books

1.Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.

2. SeemaAcharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.

Reference Books

1. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
2. AnandRajaraman and Jefrey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
4. Michael Mineli, Michele Chambers, AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley blications, 2013.
5. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012
6. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

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1. https://www.tutorialspoint.com/big_data_analytics/index.htm
2. https://www.lynda.com/Big-Data-training-tutorials/2061-0.html
3. https://www.coursera.org/specializations/big-data

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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CO3	3	3	1	2	2	2	3	-	2	1	3	1	3	3	3
CO4	3	3	-	-	3	2	2	-	2	1	3	1	3	3	-
CO5	3	2	3	2	3	2	2	-	2	1	3	1	3	3	-

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Professional Elective–3: Management Concepts for Computer Applications (Offered in Semester IV)

P20MCE401	ORGANIZATIONAL BEHAVIOUR	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To enable students to describe how people behave under different conditions and understand why people behave as they do.
- To help the students to develop cognizance of the importance of human behavior.
- To provide the students to analyze specific strategic human resources demands for future action.
- To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behavior and improve results.

Course Outcomes

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

CO1- Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization. **(K2)**

CO2- Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization. **(K2)**

CO3- Analyze the complexities associated with the management of the group behavior in the organization.

CO4- Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind the behavior of people in the organization. **(K2)**

CO5- Understand the conflict management, organizational culture and people behavior. **(K2)**

UNIT I: FUNDAMENTAL OF ORGANIZATIONAL BEHAVIOUR (9 Hrs)

Meaning, Fundamental concepts, Definition, Approaches to OB, Characteristics and limitations of OB, Challenges and Opportunities of OB, Models of OB.

UNIT II: MANAGERIAL IMPLICATIONS (9 Hrs)

Personality: Definition, Features, Big five model, MBTI, Johari Window, Managerial Implications of Personality. Perceptions and Attributions: Definition, Features, factors affecting perception, Process. Attribution, perceptual and attribution errors, Managerial Implications of Perception.

UNIT III: SOCIAL LEARNING (9 Hrs)

Learning: Definition, Features, Classical and operant conditioning, social learning theory, Behavioral modification. Attitude: Definition, Features, ABC model of Attitude, Managerial Implications of Attitude.

UNIT IV: MOTIVATIONS (9 Hrs)

Motivation: Concept, Definition, Features, Types of Motivation, Process, Managerial Implications of Motivation. Leadership: Concept, Definition, Leadership Styles, Transactional and Transformational Leadership, Leadership development. Groups and Teams: Definition, Features, Group development stages, Group vs. Teams, Managing and developing effective teams.

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UNIT V: CONFLICT MANAGEMENT **(9 Hrs)**

Conflict Management: Definition, Features, Types of Conflict, Conflict Resolution Strategies, Relationship between Conflict and Performance. Organizational Culture: Elements and dimensions of organizational culture, Importance of organizational culture in shaping the behavior of people. Organizational Change: Understanding the issues and managing change, Approaches to organizational change.

Text Books

1. Robbins, S. P., & Judge, T. (2013). Organizational behavior (15th ed.). Boston: Pearson.
2. Newstrom J. W., & Davis, K. (2011). Human behavior at work (12th ed.). Tata McGraw Hill
3. Nelson, D , Quick, J.C., & Khandelwal, P., (2011). ORGB . Cengage Learning.

Reference Books

1. Pareek. U. (2010). Understanding Organizational Behavior (2nd ed.). Oxford University Press
2. Schermerhorn, J. R., Osborn, R.N., Hunt, M.U.J (2016). Organizational Behavior (12th ed.). Wiley.

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	-	-	-	-	-	1	3	-	-	-
CO2	1	1	3	-	-	-	-	-	-	-	-	2	-	-	-
CO3	1	1	1	-	-	-	-	-	-	-	1	2	-	-	-
CO4	1	2	2	-	-	-	-	-	-	-	1	3	-	-	-

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P20MCE402	E-BUSINESS AND DIGITAL MARKETTING	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To make students understand the concepts of Electronic Commerce.
- To understand the foundations of Social media and its role in digital marketing.
- To conceptualize Social media marketing strategy formulation.

Course Outcomes

After completion of the course, the students will be able

CO1 - Understand the basic concepts and technologies used in the field of E-commerce. **(K1)**

CO2 - Have the knowledge of the different types of information systems. **(K2)**

CO3 - Understand the processes of developing and implementing information systems. **(K2)**

CO4 – Knowledge in Social marketing media application and Business Systems. **(K2)**

CO5 - Understand social media marketing strategy and planning. **(K2)**

UNIT-I E-COMMERCE **(9 Hrs)**

Foundations of Electronic Commerce - Retailing in Electronic Commerce

UNIT-II INTERNET **(9 Hrs)**

Internet Consumers and Market Research - Advertisement in Electronic Commerce

UNIT-III BUSINESS SERVICE **(9 Hrs)**

Electronic Commerce for Service Industries - Business-to-Business Electronic Commerce

UNIT IV: FOUNDATIONS OF SOCIAL MEDIA MARKETING **(9 Hrs)**

Social media and its role within Marketing The Social media environment – Social consumers – Social applications – Social business ecosystem – Network structure and group influences in Social media

UNIT- V SOCIAL MEDIA MARKETING STRATEGY AND PLANNING **(9 Hrs)**

Rules of engagement for Social media marketing Target audience – Influencers – Message/Content Developing a Social media marketing plan

Text Books

1. Dave Chaffey, E-Business and E-Commerce Management, Pearson, 2007
2. P.T. Joseph, E- commerce: An Indian Perspective, Prentice-Hall, 2009
3. Social Media Marketing: A Strategic Approach (2e). Barker, Barker, Bormann, Zahay and Roberts, 2017, Cengage Learning Social Media Marketing (3e), Tuten and Solomon, 2018, Sage.

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Reference Books

1. Ritendra Goel, E-Commerce, New Age International, 2007
2. Gary Schneider, Electronic Commerce, Cengage Learning, 2008
3. Social Media Marketing For Dummies (3e). Singh and Diamond, 2014, Wiley
4. Social Media Marketing: Next generation of business engagement, Evans and McKee, 2010, Wiley

Web References

1. http://www.ecommercetimes.com
2. http://e-commerce.net.in/
3. http://e-commerce.meetup.com
4. https://www.cengage.com/c/social-media-marketing-a-strategic-approach-2e- barker#overview
5. https://in.sagepub.com/en-in/sas/social-media-marketing/book257852
6. https://www.wiley.com/en- us/Social+Media+Marketing+For+Dummies%2C+3rd+Edition-p-9781118985533

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	2	1	1	0	2	1	3	3	2	2	1
CO2	3	2	3	3	3	3	2	0	2	1	2	3	2	2	3
CO3	3	3	2	3	2	2	3	0	2	1	3	2	3	2	3
CO4	3	2	3	2	3	3	2	0	2	1	3	3	3	3	3
CO5	3	3	3	2	2	2	3	0	2	1	2	3	3	2	3

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P20MCE403	MANAGEMENT CONCEPTS AND STRATEGIES	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To introduce the concepts of strategic management and understand its nature in competitive and institutional landscape.
- Identification, appreciation and interpretation of the critical challenges and opportunities before an organization.

Course Outcomes

After completion of the course, the students will be able

CO1 - Describe major theories, background work, concepts and research output in the field of strategic management. **(K2)**

CO2 - Understanding of the concepts, tools & techniques used by executives in developing and executing strategies and will appreciate its integrative and interdisciplinary nature. **(K2)**

CO3 - Demonstrate effective application of concepts, tools & techniques to practical situations for diagnosing and solving organizational problems. **(K2)**

CO4 - Demonstrate capability of making their own decisions in the dynamic business landscape. **(K2)**

CO5 - Develop their capacity to think and execute strategy. **(K3)**

UNIT I MANAGEMENT **(9Hrs)**

Science Theory and Practice - Management and Society: Social responsibility and Ethics. The nature and purpose of planning - objectives – Strategies Policies and planning premises.

UNIT II DECISION MAKING **(9Hrs)**

Decision making. The Nature and purpose of organizing - Basic departmentation - Line / staff Authority and decentralization - Effective Organizing and organizational culture.

UNIT III HUMAN RESOURCE **(9Hrs)**

Human Resource Management and selection - Performance appraisal and career strategy - Manager and organizational development.

UNIT IV MANAGING **(9Hrs)**

Managing and the Human factor - Motivation - Leadership - communication.

UNIT V SYSTEM PROCESS **(9Hrs)**

The system and Process of controlling control techniques and information Technology - Productivity and Operations Management - Overall and Preventive Control - Towards a unified, Global management theory.

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Text Books

1. Herald Knootz and Heinz Weihrich, Essentials of Management, McGraw-Hill Publishing Company, Singapore International Edition, 2000.
2. Ties AF, Stoner and R.Edward Freeman Management Prentice Hall of India Pvt., Ltd., New Delhi 110 011, 2003.
3. Joseph l, Massie, Essentials of Management, Prentice Hall of India Pvt., Ltd., New Delhi 110 011, 2002.

Reference Books

1. Vipin Gupta, Kamala Gollakota, R. Srinivasan, Business policy and strategic management concept and application, Oxford University Press, Chennai.
2. SukulLomesh, P.K.P.K. Mishra, Business policy and Strategic Management, Tata McGraw Hill, New Delhi.

Web References

1. www.businessweek.com
2. www.foxnews.com
3. www.atimes.com
4. www.brandweek.com

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	2	1	-	2	1	1	2	2	3	2
CO2	3	2	3	3	2	2	1	-	2	1	3	2	3	3	3
CO3	3	3	3	3	2	2	2	-	2	1	3	2	3	2	3
CO4	3	2	3	3	3	2	2	-	2	1	3	3	3	3	3
CO5	3	3	3	3	2	2	2	-	2	1	3	3	3	3	3

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P20MCE404	SOFTWARE PROJECT MANAGEMENT AND QUALITY ASSURANCE	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To understand the concept of software projects and steps in software project management.
- To enable the students to prepare business proposals for software management.
- To enable the students to evaluate the technical feasibility, financial viability, market acceptability and social desirability of software projects.
- To be effective as project managers and as part of a software project teams.

Course Outcomes

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

CO1 - Apply project management concepts and techniques to an IT project. **(K2)**

CO2 - Identify issues that could lead to IT project success or failure. **(K2)**

CO3 - Explain project management in terms of the software development process. **(K2)**

CO4 - Describe the responsibilities of IT project managers. **(K2)**

CO5 - Apply project management concepts through working in a group as team leader or active team member on an IT project. **(K2)**

UNIT I SOFTWARE PROJECTS AND METRICS (9 Hrs)

Software Project Management – Concepts and 3 P's (People, problem and process) Metrics in the process and project domains, Software measurement – size-oriented metrics, function-oriented metrics and extended function point metrics, Integrating metrics within the software process.

UNIT II SOFTWARE PROJECT PLANNING (9 Hrs)

Software Project planning – objectives, scoping, Resources – human resources, reusable software resources and environmental resources Software project estimation – Popular decomposition techniques – problem-based, process-based and empirical estimation (COCOMO model).

UNIT III SOFTWARE OUTSOURCING AND PROJECT SCHEDULING (9 Hrs)

The Make-Buy decision – creating a decision tree, Software outsourcing – issues involved Project Scheduling and tracking – relationship between people and effort – defining a task set for the software project.

UNIT IV SOFTWARE RISK MANAGEMENT AND CONFIGURATION MANAGEMENT (9 Hrs)

Risk Management – Reactive and Proactive risk strategies, Risk identification, projection, mitigation and monitoring – RMMM Plan Software configuration management – process and standards

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UNIT V SOFTWARE QUALITY ASSURANCE: (9 Hrs)

Introduction to Quality Control- Quality Control-Concepts of Quality Contorl and Quality Circle – Benefits of Quality Control and Assurance – Quality and Reliability – Cost of Quality – Quality cost Measures – Quality Improvement – Quality Management .

Text Books

1. Roger Pressman, Software Engineering: A Practitioner's Approach, Tata McGraw-Hill, 2005
2. Robert T. Futrell, Donald F. Shafer, and Linda I. Safer, Quality Software Project Management, Pearson Education, 2002
3. Allan C.Gillies “Software Quality Theory and Management, Thompson Learning.
4. Gopalaswamy Ramesh, Managing Global Software Projects, Tata McGraw-Hill Publishing Company Limited, Bangalore, 2006

Reference Books

1. Ian Sommerville, Software Engineering, Pearson Education, 2010
2. Bob Hughes and Mike Cotterell, Software Project Management, McGraw-Hill, 2009
3. P.C.Jorgensen,”Software Testing – A craftman’s Approach” CRC Press

Web References

1. http://softwareprojectmanager.org/
2. http://www.softwareprojects.org/
3. http://www.rspa.com/spi/project-mgmt.html

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CO3	3	3	2	3	2	-	3	-	2	1	3	2	3	2	3
CO4	3	2	3	2	3	-	2	-	2	1	3	3	3	3	3
CO5	3	3	3	2	2	-	3	-	2	1	2	3	3	2	3

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P20MCE405	BUSINESS ETHICS AND CORPORATE SOCIAL RESPONSIBILITY	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To define business ethics and explain what it means to act ethically in business.
- To explain why we study business ethics.
- To identify ethical issues that you might face in business, such as insider trading, conflicts of interest, and bribery, and explain rationalizations for unethical behaviour.
- To identify the steps to maintain our honesty and integrity in a business environment.
- To recognize how to avoid an ethical lapse, and why we should not rationalize when making decisions.

Course Outcomes

After completion of the course, the students should be able to:

CO1 - Understand the business ethics. **(K2)**
CO2 - Analyse corporate social Responsibility. **(K2)**
CO3 – Understand the legal aspects of ethics. **(K1**)
CO4 - Analyse various ethical codes in corporate governance. **(K2**)
CO5 - Analyse the Employees conditions and Business Ethics. **(K2)**

UNIT I INTRODUCTION (9 Hrs)

Definition & nature Business ethics, Characteristics, Ethical theories; Causes of unethical behavior; Ethical abuses; Work ethics; Code of conduct; Public good.

UNIT II ETHICS THEORY AND BEYOND (9 Hrs)

Management of Ethics - Ethics analysis [Hosmer model]; Ethical dilemma; Ethics in practice ethics for managers; Role and function of ethical managers- Comparative ethical behaviour of managers; Code of ethics; Competitiveness, organizational size, profitability and ethics; Cost of ethics in Corporate ethics evaluation. Business and ecological / environmental issues in the Indian context and case studies.

UNIT III LEGAL ASPECTS OF ETHICS (9 Hrs)

Political – legal environment; Provisions of the Indian constitution pertaining to Business; Political setup – major characteristics and their implications for business; prominent features of MRTP & FERA. Social – cultural environment and their impact on business operations, Salient features of Indian culture and values.

UNIT IV ENVIRONMENTAL ETHICS (9 Hrs)

Economic Environment; Philosophy of economic grow and its implications for business, Main features of Economic Planning with respect to business; Industrial policy and framework of government contract over Business; Role of chamber of commerce and confederation of Indian Industries.

UNIT V CORPORATE SOCIAL RESPONSIBILITY AND GOVERNANCE (9 Hrs)

Definition- Evolution- Need for CSR; Theoretical perspectives; Corporate citizenship; Business practices; Strategies for CSR; Challenges and implementation; Evolution of corporate governance; Governance practices and regulation; Structure and development of boards; Role of capital market and government; Governance ratings; Future of governance- innovative practices; Case studies with lessons learnt.

TEXT BOOKS

1. S.A. Sherlekar, Ethics in Management, Himalaya Publishing House, 2009.
2. William B. Werther and David B. Chandler, Strategic corporate social responsibility, Sage Publications Inc., 2011
3. Robert A.G. Monks and Nell Minow, Corporate governance, John Wiley and Sons, 2011.

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REFERENCE BOOKS

1. W.H. Shaw, Business Ethics, Cengage Learning, 2007.
2. Beeslory, Michel and Evens, Corporate Social Responsibility, Taylor and Francis, 1978.
3. Philip Kotler and Nancy Lee, Corporate social responsibility: doing the most good for company and your cause, Wiley, 2005.
4. Subhabrata Bobby Banerjee, Corporate social responsibility: the good, the bad and the ugly, Edward Elgar Publishing, 2007.
5. Satheesh kumar, corporate governance, Oxford University, Press, 2010.

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CO4	3	2	3	2	3	3	2	0	2	1	3	3	3	3	3
CO5	3	3	3	2	2	2	3	0	2	1	2	3	3	2	3

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