

SAINTGITS COLLEGE OF ENGINEERING

Kottukulam Hills, Pathamuttom, Kottayam

**AUTONOMOUS COLLEGE AFFILIATED TO
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY,
THIRUVANANTHAPURAM**



FIRST YEAR SYLLABUS – 2021
MCA

MCA DEGREE PROGRAMME

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Semester - I

COURSE DESCRIPTION		
Course Code	21CA101	Course Credit: 4
Course Name	Mathematical Foundations for Computing	
L-T-J-P	3-1-0-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	This course introduces students to some basic mathematical ideas and tools, which are at the core of MCA course. It introduces the concept of relations and functions.
2	The course introduces fundamental concepts in graph theory, which has got applications in MCA.
3	To understand the properties of linear system of equations and get the concept of Eigen values and Eigen vectors.
4	The course enables the students to understand and apply the concepts in number theory, and statistics.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Apply mathematical reasoning in order to read, comprehend and construct mathematical arguments.	3
CO2	Count or enumerate objects and solve counting problems and analyze algorithms.	3
CO3	Solve problems in almost every conceivable discipline using graph models.	3
CO4	Solve the linear system of equations and calculate the eigen values and eigen vectors of matrices.	3
CO5	Apply the principles of correlation and regression in practical problems.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	1	-	-	-	-	-
CO2	3	3	3	2	2	-	1	-	-	-	-	-
CO3	3	3	3	2	2	-	1	-	-	-	-	-
CO4	3	3	3	2	2	-	1	-	-	-	-	-
CO5	3	3	3	2	2		1	-	-	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test (2 Assessment Tests of two-hour duration)	4 Hours

SYLLABUS

Set, Relations and Functions - Number Theory & Recurrence relations - Graph Theory - Linear Algebra - Correlation and Regression

COURSE CONTENT

Module - I		COs	Hrs.	ESE Marks
Module Title	Set, Relations and Functions			
Sets - Set Operations		1	1	20%
Relations - Classification of relations - Matrix Representation of Relations - Reflexive and symmetric closures - Equivalence Relations - Partial Ordering		1	5	
Functions		1	2	
Module - II		COs	Hrs.	ESE Marks
Module Title	Number Theory and Recurrence relations			
Division Algorithm – GCD – Primes- Euclidean Algorithm		2	2	20%
Congruences - Properties of Congruences - Solutions of Linear Congruences (Theorems without proof)		2	3	
First Order Linear Recurrence Relation- Second Order Linear Homogeneous Recurrence Relations with Constant coefficients - Non Homogeneous Recurrence Relation		2	3	
Non-Homogeneous Recurrence Relation		2	2	
Module - III		COs	Hrs.	ESE Marks
Module Title	Graph Theory			
Graphs - Graph Terminology and Special Types of Graphs - Representing Graphs		3	3	20%
Graph Isomorphism - Connectivity		3	2	
Euler and Hamilton Paths		3	2	
Shortest Path Problems - Dijkstra's algorithm and problems		3	3	
Planar Graphs(Theorems without proof)		3	2	
Module - IV		COs	Hrs.	ESE Marks
Module Title	Linear Algebra			
Linear system of equations - Coefficient matrix - Augmented matrix - Elementary row operations - Row Echelon form and information from it		4	1	20%
Gauss elimination method and three possible cases		4	2	
Linear independence - Rank of a matrix		4	1	
Solution of linear system - Non homogeneous and Homogeneous linear system		4	2	
Matrix eigen value problem - Determination of eigen values and eigen vectors		4	2	
Diagonalization of matrix		4	2	

Module - V		COs	Hrs.	ESE Marks
Module Title	Correlation and Regression			
Bivariate data and Scatter Diagram – Interpretation of the nature and degree of relation using scattered diagram		5	1	20%
Principle of least squares		5	1	
Curve fitting – Fitting a straight line and fitting a parabola		5	2	
Karl's Pearson's Coefficient of Correlation(problems based on formula)		5	2	
Spearman's rank correlation coefficient (problems based on the formula)		5	2	

TEXT BOOKS

1	Kenneth H. Rosen, Discrete mathematics and its applications, 7 th Edition, McGraw-Hill, 2012, ISBN: 978-0-07-068188-0
2	David M. Burton, Elementary Number Theory, 7 th Edition, McGraw-Hill, 2012, ISBN: 978-0-07-338314-9
3	Ralph P Grimaldi, Discrete and Computational Mathematics: An applied introduction, 5 th Edition, Pearson Education, 2007, ISBN:978-0-20-72634-3
4	Erwin Kreyzig, Advanced Engineering Mathematics, 10 th Edition Wiley, 2011, ISBN: 978-81-265-5423-2

REFERENCE BOOKS

1	Gupta S.C and Kapoor V.K, Fundamentals of Mathematical Statistics, 11 th Edition, Sultan Chand and Sons,2014, ISBN: 81-7014-791-3
2	C. Liu, Elements of Discrete Mathematics: A Computer Oriented Approach, 4 th Edition, McGraw-Hill, 2012, ISBN: 978-0-07-066913-0
3	Jean-Paul Tremblay, Discrete Mathematical Structures with applications to Computer science, 1 st Edition, McGraw-Hill, 2001, ISBN: 978-0-07-463113-3
4	Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, 2 nd Edition, Prentice-Hall of India, 1979, ISBN:978-0-48-680793-5
5	S. C. Gupta, Fundamentals of Statistics, 10 th Edition, Himalaya Publishing House, 2012, ISBN: 81-7014-791-3

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100

End Semester Examination Pattern

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

A	Total Pages:		3
Register No.:		Name:	

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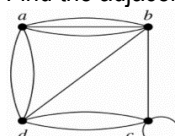


FIRST SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA101		
Course Name:	Mathematical Foundations for Computing		
Max. Marks:	60	Duration:	3 Hours

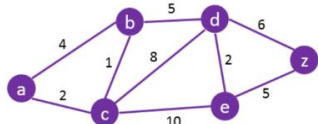
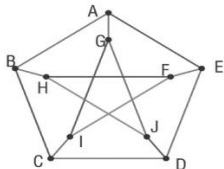
PART A

(Answer all questions. Each question carries 3 marks)

	Questions	CO	BTL	MARKS
1.	Let A, B and C be sets. Show that $\overline{(A \cup (B \cap C))} = (\bar{C} \cup \bar{B}) \cap \bar{A}$	1	2	3
2.	Find the sets A and B if $A-B = \{1,5,7,8\}$; $B-A = \{2,10\}$ and $A \cap B = \{3,6,9\}$.	1	2	3
3.	Use the Euclidean algorithm to obtain integers x and y satisfying $\gcd(56,72) = 56x + 72y$.	2	3	3
4.	Solve the recurrence relation $a_n = 7a_{n-1}$ where $n \geq 1$ and $a_2 = 98$.	2	3	3
5.	How many edges are there in a graph with 20 vertices each of degree 3?	3	2	3
6.	Find the adjacency matrix to represent the pseudograph 	3	2	3
7.	Define rank of a matrix. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 2 & 2 \end{bmatrix}$	4	2	3
8.	Determine whether the vectors (1,0,2), (0,1,1) and (2,1,0) are linearly independent or not.	4	2	3
9.	State the principle of least squares.	4	2	3
10.	What are the normal equations for fitting of a second degree parabola $y = ax^2 + bx + c$?	4	2	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I					
11.	a)	Define Reflexive and symmetric closures of a relation.	1	2	2
	b)	Let R be the relation on the set {0, 1, 2, 3} containing the ordered pairs (0, 1), (1, 1), (1, 2), (2, 0), (2, 2) and (3, 0). Find the reflexive and symmetric closures of R.	1	2	4
OR					
12.	Let $R = \{ (a,b) / a \leq b \}$ be a relation on a set of integers. Is R a reflexive, symmetric, antisymmetric and transitive relation? Justify your answer.		1	3	6
MODULE II					
13.	Solve the following set of simultaneous congruence's $x \equiv 5(\text{mod } 11)$ $x \equiv 14(\text{mod } 29)$ $x \equiv 15(\text{mod } 31)$		2	3	6
OR					
14.	Solve the non-homogeneous recurrence relation $a_{n+2} - 4a_{n+1} + 3a_n = -200$; where $n \geq 0$, $a_0 = 3000$, $a_1 = 3300$.		2	3	6
MODULE III					
15.	Find the length of the shortest path between a and z in the weighted graph using Dijkstra's algorithm 		3	3	6
OR					
16.	Determine whether the Petersen graph is planar. 		3	3	6
MODULE IV					
17.	a)	Show that the following system of equations are consistent $x + 2y + z = 3$ $2x + 3y + 2z = 5$ $3x - 5y + 5z = 2$ $3x + 9y - z = 4$	4	3	4
	b)	Solve the above system of equations.	4	3	2
OR					
18.	Examine whether $A = \begin{bmatrix} 1 & -3 & 3 \\ 0 & -5 & 6 \\ 0 & -3 & 4 \end{bmatrix}$ is diagonalisable? If yes, find a matrix which diagonalises A?		4	3	6

MODULE V												
19.	Fit a straight line $y = ax + b$ to the following data									5	3	6
	X	1	2	3	4	6	8					
	Y	2.4	3	3.6	4	5	6					
OR												
20.	Find the rank correlation coefficients for the following data									5	3	6
	X	15	20	28	12	40	60	20	80			
	Y	40	30	50	30	20	10	30	60			

COURSE DESCRIPTION		
Course Code	21CA102	Course Credit: 4
Course Name	Advanced Data Structures	
L-T-J-P	3-1-0-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	This course gives due exposure to various levels of developments in data structure.
2	This course is designed to build upon the knowledge acquired at the undergraduate level and familiarise students with a bunch of modern data structures which are quite useful to solve, in the most effective manner, the modern, real life problems.
3	To familiarise advanced concepts about linked lists, trees and graphs.
4	To understand basic operation of block chaining along with the data structures used in it and the challenges in block chain data.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Ability to describe linked list and set operations.	4
CO2	Apply advanced tree structures for the design of efficient algorithms.	4
CO3	Acquire the knowledge of various heap structure and its applications.	4
CO4	Apply advanced graph algorithms suitable for solving advanced computational problems.	3
CO5	Identify the usage of hashing and to understand the basic operation of block chaining along with the data structures used in it and the challenges in block chain data.	4

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	1	-	-	-	-	-	-	-
CO2	2	2	3	2	1	-	1	-	-	-	-	-
CO3	2	3	3	2	1	-	1	-	-	-	-	-
CO4	3	3	2	1	2	-	1	-	-	-	-	-
CO5	3	2	2	2	3	-	1	-	-	-	-	-

Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test (2 Assessment Tests of two-hour duration)	4 Hours

SYLLABUS

Linked Data Structures and Set - Advanced Tree Structures - Advanced Heap Structures - Graph Structures - Hashing and Blockchain Data Structure

COURSE CONTENT

Module-I		COs	Hrs.	ESE Marks
Module Title	Linked Data Structures and Set			
Introduction of singly linked list – Insertion - Deletion		1	3	20%
Linked stack - Linked queues		1	2	
Doubly linked list and Circular linked list – Insertion - Deletion		1	4	
Representation of sets - Set implementation using bit string		1	1	
Disjoint sets – representations – Union - Find algorithms		1	1	
Module-II		COs	Hrs.	ESE Marks
Module Title	Advanced Tree Structures			
Introduction to trees and tree representation - Traversals		2	1	20%
Introduction to balanced binary search trees		2	1	
B trees - Insertion and deletion		2	3	
Red-Black trees - Properties of Red Black trees		2	1	
Rotations – Insertion - Deletion		2	3	
Introduction to splay trees		2	1	
Introduction to suffix trees		2	1	
Module-III		COs	Hrs.	ESE Marks
Module Title	Advanced Heap Structures			
Introduction about heap structure - max and min heap		3	1	20%
Advanced heap structures: Mergeable heaps and operations on mergeable heaps		3	2	
Binomial heaps - Binomial heap operations and analysis		3	3	
Fibonacci heaps - Fibonacci heap operations and analysis		3	3	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Graph Structures			
Introduction and representation of graphs		4	1	20%
Depth first and Breadth first traversals		4	2	
Topological sorting		4	1	
Strongly connected components and Biconnected components		4	1	
Minimum cost spanning tree - prim's algorithm		4	2	
Kruskal's algorithm		4	1	
Shortest path finding algorithms – Dijkstra's single source shortest paths algorithm		4	1	
Module-V		COs	Hrs.	ESE Marks
Module Title	Hashing and Blockchain Data Structure			
Hashing - Simple hash functions - Collision and collision resolution techniques		5	3	20%
Blockchain architecture		5	2	
Blockchain data structures		5	1	
Blockchain data types		5	1	
Contract data		5	1	

TEXT BOOKS	
1	Cormen T.H., Leiserson C.E., Rivest R.L. and Stein C., Introduction to Algorithms, Prentice Hall India, New Delhi, 3 rd Edition, 2009, ISBN: 9788120340077
2	G S Baluja, Data Structures – Through C, Dhanpat Rai & CO, 2016, ISBN: 9786500092332
3	Yang, Xiaojing, Jinshan Liu, and Xiaohe Li, Research and Analysis of Blockchain Data, Journal of Physics: Conference Series. Vol. 1237. No. 2. IOP Publishing, 2019. DOI: 10.7544/ ISSN1000-1239.2018.20180127

REFERENCE BOOKS	
1	Udith Agarwal, Algorithms Design and Analysis, Dhanpat Rai & Co., 2017, ISBN 9788177000757
2	Kleinberg Jon and Eva Tardos, Algorithm Design, Pearson Education India, 2006, ISBN 9780321295354
3	Aho A.V., Hopcroft J.E., and Ullman J.D., Data Structures and Algorithms, Pearson Education, New Delhi, 1983, ISBN 13: 9780201000238
4	Sahni S., Data Structures, Algorithms, and Applications in C++, Mc Graw Hill, 2000, ISBN-13: 978-0072362268
5	Richard F Gilberg, Behrouz A Forouzan, Data Structures – a pseudocode approach with C, Thomson Learning, 2 nd Edition, Cengage Learning C, 2005, ISBN-13: 9780534390808
6	Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures In C, Orient Blackswan, 2008, ISBN: 9788173716058, 8173716056

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	8
End Semester Examination (ESE)	60
Total	100
End Semester Examination Pattern	
There will be two parts; Part A and Part B. Part A: 30 marks Part B: 30 marks Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.	

B	Total Pages:		2
Register No.:		Name:	

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FIRST SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA102		
Course Name:	Advanced Data Structures		
Max. Marks:	60	Duration:	3 Hours

PART A

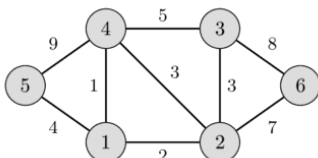
(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	Write a short note on disjoint set operations.	1	1	3
2.	Briefly explain about set implementation using bit string.	1	2	3
3.	What is meant by Splay tree?	2	1	3
4.	Create a binary search tree for the following data and do in-order and post-order traversal of the tree. 50, 60, 25, 40, 30, 70, 35, 10, 55, 65, 5.	2	3	3
5.	Explain binomial tree and binomial heap property.	3	2	3
6.	Differentiate between binomial heap and fibonacci heap.	3	4	3
7.	Briefly explain dijkstra's single source shortest paths algorithm.	4	2	3
8.	State the principle of Topological sorting.	4	1	3
9.	What are the types of blockchain based on the classification according to different application scenarios and network admission mechanism?	5	4	3
10.	What is contract data?	5	1	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	What do you mean by linked list? Write an algorithm to insert and delete a node in singly linked list.	1	1	6
OR				
12.	What is circular linked list? State the advantages and disadvantages of circular linked list over doubly linked list and singly linked list. Also write advantages of linked list over an array.	1	4	6

MODULE II				
13.	Define a Red-Black tree. Explain the insertion operation in a Red-Black tree.	2	4	6
OR				
14.	Write the characteristics of a B-tree of order m. Create B-tree of order 5 from the following list of data items: 20,30,35,85,10,55,60,25,5,65,70,75,15,40,50,80,45.	2	3	6
MODULE III				
15.	With the help of a suitable example, explain how the decrease-key operation is performed on Fibonacci heap.	3	4	6
OR				
16.	With the help of a suitable example, explain the procedure for insertion and union operations in binomial heap.	3	2	6
MODULE IV				
17.	Define Depth First Search. With the help of a suitable example, write an algorithm for DFS with its time complexity.	4	1	6
OR				
18.	<p>Define minimum cost spanning tree. Write kruskal's algorithm to generate a minimum cost spanning tree for any given weighted graph. Generate minimum cost spanning tree for the following graph using kruskal's algorithm.</p> 	4	3	6
MODULE V				
19.	Explain the data models in blockchain.	5	2	6
OR				
20.	<p>Write the sequence of steps to insert the keys 42,26,36,60,12,13,92 into the hash table with N=13. Assume that the hash function is $h(k)=k \bmod N$. Resolve the collisions using</p> <ol style="list-style-type: none"> Linear probing Quadratic probing Double hashing. 	5	3	6

COURSE DESCRIPTION		
Course Code	21CA103	Course Credit: 4
Course Name	Advanced Software Engineering	
L-T-J-P	3-0-0-1	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	Gain knowledge on project management approaches as well as cost and schedule estimation strategies.
2	Develop deep knowledge on Configuration Management and Version Control using Git.
3	Examine software development and testing approaches.
4	Inspect the advantages of DevOps practices and automation.
5	Analyze software reuse and advanced software engineering methods.
6	Study the aspects of system dependability, security and reuse.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Develop a deep knowledge of Software Planning, Analysis and Design and Software Engineering Models.	3
CO2	Apply Coding Practices, Version Control using 'Git' and Software Quality.	3
CO3	Develop knowledge in Agile Software Development, Software Testing and automation.	3
CO4	Examine System dependability and security aspects.	4
CO5	Analyze software reuse and advanced software engineering methods.	4

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	2	-	-	-	-	1	-	-	-	-
CO3	3	-	3	-	1	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	2	-	-	-	-	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

EMBEDDED THEORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	36 Hours
Internal Test (2 Internal assessment tests of two-hour duration)	4 Hours

SYLLABUS

Introduction - Software Management - Agile Software Development and Software Testing - System Dependability and Security - Advanced Software Engineering Concepts

COURSE CONTENT - EMBEDDED THEORY

Module-I		COs	Hrs.	ESE Marks
Module Title	Introduction			
Recapitulation of: Software Engineering Process Models and Basic Techniques of Requirements Engineering and Design		1	1	20%
Project Management: Risk Management - Managing People - Teamwork		1	1	
Project Planning: Software Pricing - Plan Driven Development		1	1	
Project Scheduling - Agile Planning		1	1	
Estimation for Software Projects: Estimation Techniques - COCOMO Cost Modelling		1	1	
Module-II		COs	Hrs.	ESE Marks
Module Title	Software Management			
Quality Management: Software Quality - Software Standards - Reviews and Inspections - Quality Management and Agile development		2	1	20%
Software Measurement		2	1	
Configuration Management: Version Management - Version Management using Git		2	1	
Working with Git - Organizing Your Repository with Branches and Tags - Working with a Team		2	1	
Branches and Merging - Working with the Repository's History - Fixing Things		2	1	
System Building - Change Management-Release Management		2	1	
Continuous Integration: Delivery - Build and Deployment - Automation		2	1	
Module-III		COs	Hrs.	ESE Marks
Module Title	Agile Software Development and Software Testing			
Agile Methods - Agile Development Techniques - Agile Project Management - Scaling Agile Methods		3	1	20%
Open Source Development - Agile Software Development using DevOps - Overview of DevOps: Components of DevOps - DevOps Life Cycle		3	1	
Configuration Management in DevOps - Release Management in DevOps - Application Performance Monitoring Process in DevOps		3	1	
Software Testing: Development Testing - Test Driven Development - Release Testing		3	1	
User Testing - DevOps Continuous Testing Tools		3	1	
Ansible for DevOps and automation		3	1	
Module-IV		COs	Hrs.	ESE Marks
Module Title	System Dependability and Security			
Dependable Systems: Dependability Properties - Sociotechnical Systems - Redundancy and Diversity - Dependable Processes		4	1	
Formal Methods and Dependability - Reliability Engineering: Availability and Reliability - Reliability Requirements		4	2	

Fault Tolerant Architectures - Programming for Reliability - Reliability Measurement		4	1	20%
Safety Engineering: Safety Critical Systems - Safety Requirements - Safety Engineering Processes - Safety Cases		4	2	
Security Engineering: Security and Dependability - Security and Organizations - Security Requirements		4	1	
Secure Systems Design - Security Testing and Assurance		4	1	
Resilience Engineering: Cyber Security - Sociotechnical Resilience - Resilient Systems Design		4	1	
Module-V		COs	Hrs.	ESE Marks
Module Title	Advanced Software Engineering Concepts			
Software Reuse: The Reuse Landscape- Application Frameworks- Software Product Lines- Application System Reuse		5	1	20%
Component Based Software Engineering: Components and Component Models- CBSE Processes- Component Composition		5	1	
Distributed Software Engineering: Distributed Systems- Client-Server Computing- Architectural Patterns for Distributed Systems		5	2	
Software as a Service- Service Oriented Software Engineering: Service Oriented Architecture- RESTful Services- Service Engineering- Service Composition		5	2	
Systems Engineering: Sociotechnical Systems- Conceptual Design- System Procurement- System Development- System Operation and Evolution- System Complexity		5	2	
Real Time Software Engineering - Embedded System Design - Architectural Patterns - Timing Analysis - Real Time Operating Systems		5	1	

TEXT BOOKS

1	Ian Sommerville, Software Engineering, 10 th Edition, Pearson Education, 2016, ISBN 10: 1-292-09613-6, ISBN 13: 978-1-292-09613-1
2	Roger S Pressman, Bruce R Maxim, Software Engineering: A Practitioner's Approach, 8 th Edition, Mc Graw Hill, 2015, ISBN10: 0078022126, ISBN13: 9780078022128
3	Travis Swicegood, Pragmatic Guide to Git, The Pragmatic BookShelf, O'Reilly, 2010, ISBN-10:9781934356722, ISBN-13:978-1934356722

REFERENCE BOOKS

1	Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, 2 nd Edition, PHI Learning Pvt. Ltd., 2010, ISBN-10:0133056996, ISBN-13:978-0133056990
2	Rajib Mall, Fundamentals of Software Engineering, 5 th Edition, PHI Learning Pvt. Ltd., 2018, ISBN-10:9789388028028, ISBN-13:978-9388028028
3	Michael Hüttermann, DevOps for Developers, Apress, 2012, ISBN-10:1430245697, ISBN-13:978-1430245698
4	D. Gustafson, Schaum's Outline of Software Engineering, McGraw-Hill, 2002, ISBN-10:0071377948, ISBN-13:978-0071377942
5	Juz Humble, David Farley, Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation", Addison-Wesley, 2010, ISBN-10:9780321601919

EMBEDDED LAB

COURSE IMPLEMENTATION CLOCK (IN HOURS)

Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	12 Hours
Internal Test	1 Hour

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	Yogesh Raheja, Automation with Ansible, Wiley, 2017, ISBN-13: 978-8126570331
2	Jeff Geerling, Ansible for DevOps, 2 nd Edition, http://leanpub.com/ansible-for-devops , 2020, ISBN: 978-0-9863934-3-3

COURSE CONTENT - EMBEDDED LABORATORY

List of Laboratory Experiments		COs	Hours
1	Version Control using Git- Installing Git, Working with Git	2	4
2	Configuration management with Ansible	2	2
3	Run ad-hoc automation tasks from the command line	4	2
4	Work with Ansible in conjunction with Vagrant and Virtualbox in a DevOps environment	4	4

MODES OF EVALUATION

SCORE WEIGHTAGE / SPLIT MARKS

Continuous Internal Evaluation (CIE) (Theory)	20
Internal Test - I	10
Internal Test - II	10
Continuous Internal Evaluation (CIE) (Laboratory)	12
Day to day performance and documentation	08
Test and viva voce	04
Attendance (Theory and Laboratory together)	8
End Semester Examination (ESE) Theory	60
Total	100

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

C	Total Pages:		2
Register No.:		Name:	

SAINTGITS COLLEGE OF ENGINEERING KOTTAYAM, KERALA

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)



FIRST SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA103		
Course Name:	Advanced Software Engineering		
Max. Marks:	60	Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	What is agile planning?	1	1	3
2.	Comment on the need of teamwork in project management.	1	1	3
3.	Write a short note on Change Management.	2	1	3
4.	What is the significance of continuous integration?	2	1	3
5.	Analyze the DevOps Life Cycle.	3	2	3
6.	Write a short note on Test Driven Development.	3	1	3
7.	Compare Availability and Reliability with respect to reliability engineering.	4	3	3
8.	Explain the term Resilience Engineering.	4	1	3
9.	Comment on software as a service.	5	2	3
10.	Write a short note on Component Based Software Engineering.	5	1	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I					
11.	a)	Comment on the estimation techniques.	1	2	3
	b)	Write a short note on COCOMO cost modelling.	1	1	3
OR					
12.	a)	Explain the risk management process.	1	1	3
	b)	How is software pricing done?	1	2	3
MODULE II					
13.	a)	Explain the significance of quality management in agile development.	2	2	3
	b)	Explain branching and merging in Git.	2	3	3
OR					
14.	a)	Analyze Git as a version management tool.	2	3	3
	b)	Write a short note on Release Management.	2	1	3
MODULE III					

15.	a)	Write a short note on Agile Project management.	3	2	3
	b)	Compare development testing and release testing.	3	2	3
OR					
16.	a)	Explain open source development.	3	2	3
	b)	Write a short note on DevOps continuous testing tools.	3	3	3
MODULE IV					
17.		Explain Security Engineering in detail.	4	2	6
OR					
18.	a)	Discuss safety engineering with respect to critical systems.	4	3	3
	b)	Comment on the safety engineering processes.	4	3	3
MODULE V					
19.	a)	What is Distributed Software Engineering?	5	1	2
	b)	Explain the architectural patterns for Distributed Systems.	5	2	4
OR					
20.	a)	What are socio technical systems?	5	1	2
	b)	Comment on the design, procurement and development of socio technical systems	5	4	4

COURSE DESCRIPTION		
Course Code	21CA104	Course Credit: 4
Course Name	Advanced Computer Networks	
L-T-J-P	3-1-0-0	
Year of Introduction	2021	
COURSE OBJECTIVES		
1	Enumerate the layers of the OSI model, TCP/IP and the function(s) of each layer.	
2	To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.	
3	To “fill-in” gaps in students’ networking knowledge.	
4	Describe how routing protocols work.	
COURSE OUTCOMES (COs)		REVISED BLOOM’S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Comprehend the terminology and concepts of basic communication model, analyse the protocol layers and design application layer protocols.	3
CO2	Analyse the various transport layer protocols.	2
CO3	Compare and contrast various routing algorithms in the network layer.	3
CO4	Analyse the concepts of link layer and physical layer.	1
CO5	Explain how modern cellular and wireless networks work.	1

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	2	2	2	-	3	-	2	-
CO2	3	3	-	-	2	2		-	3	-	2	-
CO3	3	3	-	-	2	2	2	-	3	-	2	-
CO4	3	3	-	-	-	2	-	-	3	-	2	-
CO5	3	3	-	-	-	2	-	-	3	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- “-”												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test (2 Assessment Tests of two-hour duration)	4 Hours

SYLLABUS

OSI model and TCP model - Transport Layer Protocols - Network Layer Protocols - Routing algorithms - Link layer and Physical Layer - Introduction to network management

COURSE CONTENT

Module-I		COs	Hrs.	ESE Marks
Module Title	OSI model and TCP model			
Overview of Computer Networks and the Internet - History		1	3	20%
Protocols-Protocol layering - OSI model and TCP model		1	3	
Application layer protocols- Client-server architecture – Web – HTTP – FTP – SMTP - POP3 - DNS		1	3	
Peer -to-peer file sharing networks		1	1	
Module-II		COs	Hrs.	ESE Marks
Module Title	Transport Layer Protocols			
Transport Layer Protocols- Introduction to transport layer- Multiplexing and de-multiplexing		2	3	20%
Connectionless transport UDP		2	2	
Principles of Reliable data transfer - Stop-and-wait and Go – back- N		2	3	
Connection oriented transport TCP		2	2	
Module-III		COs	Hrs.	ESE Marks
Module Title	Network Layer Protocols- Routing algorithms			
Network Layer Protocols-Virtual circuits and datagrams – Network-Layer Performance - Congestion control		3	3	20%
Principles of routing - internet protocol Ipv4 CIDR		3	2	
Routing algorithms– Link-state and distance vector routing - Routing on the internet RIP - OSPF and BGP		3	3	
Multicast routing - Introduction to IPV6 and software defined networks- Open flow		3	2	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Link layer and Physical Layer			
Link layer and Physical Layer- Introduction to link layer - Error detection (parity-check sum and CRC)		4	2	20%
Multiple access protocols (collision and token based)		4	2	
IEEE 802.3 Ethernet - Switching and bridging – Media - Signal strength and interference		4	2	
Data encoding - Ethernet switches - Routers MAC – ARP - FIB		4	2	
Module-V		COs	Hrs.	ESE Marks
Module Title	Introduction to network management			
IEEE 802.11 - Wi-Fi – Bluetooth - and cellular networks		5	3	20%
Network Address Translation – Firewalls – VPNs - Introduction to network management - SNMP		5	3	
Overview of tools and troubleshooting - Traffic analysis tools and Configuration management		5	4	

TEXT BOOKS	
1	Behrouz A Forouzan, Firouz Mosharraf, Computer Networks: A top down Approach, 1 st Edition, McGraw Hill Education, 2011, ISBN-10 : 0073523267
2	James F Kurose and Keith W Ross, Computer Networking: A Top - Down Approach, 6 th Edition, Pearson Education, 2017, ISBN-13: 978-9332585492
3	William Stallings, Foundations of Modern Networking: SDN, NFV, QoE, IoT, and Cloud, 1 st Edition, Pearson Education, 2016, ISBN-13: 978-0134175393
REFERENCE BOOKS	
1	Kevin R. Fall, W. Richard Stevens, TCP/IP Illustrated, Volume 1-The Protocols, 2 nd Edition, Pearson Education, 2014, ISBN-10: 9789332535954
2	Larry Peterson, Bruce Davie, Computer Networks, A systems Approach, 5 th Edition, Morgan Kaufmann Publishers, 2011, ISBN-10: 9780123850591
3	Uyless Black, Computer Networks: Protocols, Standards and Interface, 8 th Edition, Prentice Hall India Learning Private Limited, 2015, ISBN: 9788131702055
4	Andrew S. Tanenbaum, David J, Computer Networks“, 5 th Edition, Wetherall ,Prentice, 2010, ISBN-13: 978-0-13-212695-3
5	Jeffrey S Beasley, A Practical Guide to Advanced Networking, 3 rd Edition, Exam cram, 2012, ISBN 10: 0789749041

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100
End Semester Examination Pattern	
<p>There will be two parts; Part A and Part B.</p> <p>Part A: 30 marks</p> <p>Part B: 30 marks</p> <p>Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.</p>	

D	Total Pages:		2
Register No.:		Name:	

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR



Course Code:	21CA104		
Course Name:	Advanced Computer Networks		
Max. Marks:	60	Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	Explain HTTP request-response behavior with a neat diagram.	1	1	3
2.	Illustrate the importance of layering in data communication.	1	3	3
3.	Discuss about three-way handshaking in TCP.	2	2	3
4.	Why does UDP use port number and not process id?	2	1	3
5.	Illustrate RIP.	3	3	3
6.	How is routing table is different from forwarding table?	3	1	3
7.	Write a note on router.	4	2	3
8.	Explain ARP.	4	1	3
9.	List the components of SNMP.	5	2	3
10.	Write notes on IEEE 802.11 standard.	5	2	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	Compare and contrast OSI and TCP/IP network reference models.	1	4	6
OR				
12.	Why are the layers of the OSI Reference model important to the network administrator? How layers of OSI model exchange information to establish a connection? Describe with the help of neat diagram.	1	1	6
MODULE II				
13.	Compare and contrast Multiplexing and De-multiplexing process in transport layer.	2	3	6
OR				
14.	Outline in detail the two well-known data transport protocols provided by the Internet transport layer.	2	3	6
MODULE III				

15.	Compare and contrast IPv4 and IPv6.	3	3	6
OR				
16.	Differentiate virtual circuits and datagram networks.	3	4	6
MODULE IV				
17.	Explain how parity is used to achieve error detection in data communication.	4	2	6
OR				
18.	Illustrate IEEE 802.3 frame structure.	4	1	6
MODULE V				
19.	List out and explain the various IEEE 802.11 WLAN Components.	5	1	6
OR				
20.	Explain the architecture of Bluetooth in personal area networks.	5	2	6

COURSE DESCRIPTION		
Course Code	21CA106	Course Credit: 2
Course Name	Python Programming Lab	
L-T-J-P	0-1-3-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To develop proficiency in the programming language.
2	To be able to understand various data structures in python language.
3	To implement object-oriented concepts using python.
4	To be able to develop web-based applications using python.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Apply the fundamentals of python language.	3
CO2	Define and demonstrate the use of built-in data types, control statements and functions.	3
CO3	Apply modules and package efficiently in new software applications	3
CO4	Implement object-oriented programming, exception handling and file handling.	3
CO5	Design and develop web applications using Django framework.	4

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	3	-	-	-	-	-	-	-
CO2	2	2	3	3	2	-	-	-	-	-	-	-
CO3	2	1	2	3	2	-	-	-	-	-	-	-
CO4	3	1	2	2	3	-	-	-	-	-	-	-
CO5	3	3	3	2	2	-	-	-	-	2	-	-

Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"

TUTORIAL

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	12 Hours

SYLLABUS

Basic Python Concept - Function , Range - Decision Making & Loops - Data Type - Modules and Packages – Lambda
- OOPS Concept - Django Framework

COURSE CONTENT – TUTORIAL

List of Tutorials		COs	Hours
1	Python Basics: Input, output concept - mathematical operation - place operator - variable - strings	1	1
2	Function, Range	1	1
3	Decision Making & Loops: - If statement - elif statement - for - while	2	1
4	Data Types: List - Tuple - Dictionary	2	1
5	Modules and Packages	3	1
6	Lambda Expression	3	1
7	OOP Concepts: Class - Object - Inheritance - Operator Overloading - Data Hiding	4	1
8	Exception Handling: try - except - finally	4	1
9	File Handling: read - write - append	4	1
10	Regular Expressions: search - findall - find replace - match - character class	5	1
11	Tkinter: Introduction - Widgets	5	1
12	Django Framework: Introduction to Django - virtualenv - MVT architecture - ORM concepts - admin panel - apps creation using Django	5	1

TEXT BOOKS

1	John V. Guttag, Introduction to Computation and Programming using Python, The MIT Press, 3 rd Edition, 2021, ISBN-10: 0262542366
2	Wesley J Chun, Core Python Applications Programming, 3 rd Edition, Pearson, 2012, ISBN-10: 0132678209 ISBN-13: 978-0132678209
3	Charles Dierbach, Introduction to Computer Science using Python, Willy 1 st Edition, 2015, ISBN-10: 8126556014

REFERENCE BOOKS

1	Allen B. Downey, Think Python: How to Think Like a Computer Scientist, Shroff/O'Reilly, 2 nd Edition 2016, ISBN-10: 9789352134755
2	Dan Bader, Python Tricks: A Buffet of Awesome Python Features, Dan Bader, 1 st Edition 2017, ISBN-10: 1775093301
3	Sumita Arora, Computer Science with Python Textbook and Practical Book, Dhanpat Rai & Co, 1st Edition 2021, ISBN-10: 8177002368
4	Guttag John V, Introduction to Computation and Programming Using Python with Application to Understanding Data, PHI 2 nd Edition, 2016, ISBN-10: 9788120352926
5	Jeeva Jose and P Sojanlal, Introduction To Computing And Problem Solving With Python, John Wiley publications, New Delhi, 2016, ISBN-10: 0470555157

PROJECT

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	36 Hours
Internal Test	2 Hours

COURSE CONTENT - PROJECT			
List of Experiments		COs	Hours
1	Program to find the area of circle.	1	1
2	Program to print user's first and last name in reverse order.	1	1
3	Create a function to display the squares of numbers from 4 to 8.	2	1
4	a) Using a for-loop and a range function, print Good Programmer 20 times. b) Using while loop to print even numbers from 20 to 100 c) Construct the following pattern using nested loop * ** *** **** *****	2	2
5	Create a list of your favourite's subjects, with minimum 6 elements. a) List out the 4 th element in the list. b) Add a new item to the current list and display the list. c) Insert an element named abcd at the 2 nd index position and print the elements.	3	2
6	a) Program to add an item in a tuple b) Program to convert a tuple to a string. c) Program to get the 4 th element.	3	2
7	Script to generate and print a dictionary contains a number between 1 and n in the form (x, x*x)	3	2
8	Evaluate the mathematical expression $x*(x*10)^4$ where $x=3$ using lambda expression	3	2
9	Define a super class MCA with appropriate details. Derived two sub classes Regular MCA and Integrated MCA with two methods to get an display their specifications. Create an object of regular/integrated MCA class and make sure to call all the methods from the MCA class as well as the methods from the own class.	4	3
10	Overload the multiplication operator to behave like a division operator.	4	3
11	Create a registration form using Tkinter	5	3
12	Display a welcome message using Django	5	4
13	a) A Django personal blog b) Kerala Travel and Tourism website c) Movie Registration Portal	5	10

	d) Online Assignment Submission e) Student Information System f) Calculator Application g) Inventory Management h) Current News Blog Website i) Dictionary Web App j) Resume Builder Application k) To-do App in Django l) Poll App using Django		
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LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	Wesley J Chun, Core Python Applications Programming 3 rd Edition, Pearson, ISBN-10: 132678209 ISBN-13: 978-0132678209
2	Charles Dierbach, Introduction to Computer Science using Python, Willy 1 st Edition, 2015, ISBN-10: 8126556014
3	Gutttag John V, Introduction to Computation and Programming Using Python with Application to Understanding Data, PHI 2 nd Edition, 2016, ISBN-10: 9788120352926

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE) (Project)	16
Review– I	08
Review– II	08
Continuous Internal Evaluation (CIE) (Laboratory)	16
Day to day performance and documentation	08
Test and viva voce	08
Attendance (CIE Project and CIE Laboratory)	08
End Semester Examination (ESE)	60
Program logic and code	20
Output	10
Viva	10
Project presentation	20
Total	100

COURSE DESCRIPTION		
Course Code	21CA107	Course Credit: 2
Course Name	Web Programming Lab	
L-T-J-P	0-0-0-4	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	Aims at providing practical knowledge in markup language.
2	Provides practical knowledge in designing style sheets.
3	Helps to understand and practice client-side scripting.
4	Helps to understand and practice Server-side scripting.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Explore markup language features and apply those features to develop web pages.	3
CO2	Apply styling information to web pages.	3
CO3	Apply client-side scripting and validation using scripting languages.	3
CO4	Apply server-side scripting using scripting languages.	3
CO5	Write web programs using client-side and server-side scripts combining with databases.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	1	-	2	-	-	-	-	-	-	-
CO2	2	-	1	-	2	-	-	-	-	-	-	-
CO3	2	-	1	-	2	-	-	-	-	-	-	-
CO4	2	-	1	-	2	-	-	-	-	-	-	-
CO5	3	-	1	-	3	-	-	-	-	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

LABORATORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test	3 Hours

SYLLABUS

HTML – CSS – JavaScript - PHP

TEXT BOOKS

1	Rob Larsen, Beginning HTML and CSS, Wiley, 2013, ISBN: 8126541717
2	David Flanagan, JavaScript: The Definitive Guide, 7 th Edition, O'Reilly, 2020, ISBN: 9352139968
3	Kevin Tatroe, Programming PHP, 3 rd Edition, O'Reilly, 2013, ISBN: 9351102114

REFERENCE BOOKS

1	D. Comer, The Internet Book, 4 th Edition, Prentice Hall, 2009, ISBN-10: 9788120336964, ISBN-13: 978-8120336964
2	Deitel, Deitel, Goldberg, Internet & World Wide Web How To Program, 4 th Edition, Pearson Education, 2009, ISBN: 9780136035428, 9780136035428
3	Thomas A Powell, HTML & CSS: The Complete Reference, 5 th Edition, McGraw-Hill, 2017, ISBN-10 : 9780070701946, ISBN-13: 978-0070701946
4	Thomas A Powell, Fritz Schneider, JavaScript: The Complete Reference, 3 rd Edition, Tata McGraw Hill, 2012. ISBN-10: 0071741208, ISBN-13: 978-0071741200
5	Steve Suehring, Tim Converse, and Joyce Park, PHP6 and MySQL Bible, Wiley India Pvt Ltd, 2009 ISBN-10: 8126520221, ISBN-13: 978-8126520220

COURSE CONTENT - LABORATORY

List of Laboratory Experiments		COs	Hours
1	Using HTML, print the numbers 1 - 5, each number in different colour.	1	1
2	Develop an HTML document to print a paragraph with 3 sentences. Each sentence should be a different colour, font and size.	1	1
3	Print two lists with any information you want. One list should be an ordered list; the other list should be an unordered list.	1	1
4	Create hyperlinks to three different websites that should all open in a new window.	1	1
5	Create a page with a few headings as hyperlinks. When clicked you should be redirected to the corresponding sections below on the same page.	1	1
6	Display three different images. Skip two lines between each image. Each image should have a heading.	1	1
7	Create two images as hyperlinks. When clicked one image should get opened in the same window, other in a different window.	1	1
8	Demonstrate the use of HTML tables.	1	2
9	Write an HTML document that demonstrates frames	1	1
10	Create a HTML registration form application.	1	2
11	Create a HTML 5 document to demonstrate the use of the page layout tags.	1	1
12	Design a CSS to show three different paragraphs each with different font style, colour and size.	2	1
13	Create a CSS that loads an image into the web page. The image should repeat itself in the x and y positions.	2	1
14	CSS that displays a paragraph and a heading with borders of different sizes, styles and colours.	2	1
15	Create a .css file and link it with a web document that will display two paragraphs with different line spacing.	2	1

16	Display three images in three different coordinates using absolute positioning.	2	1
17	Implement z-index positioning with an image, paragraph and heading.	2	1
18	Write a JavaScript program to perform temperature conversion.		1
19	Develop a JavaScript program to find the largest of 3 numbers.	3	1
20	Write a JavaScript program to find a number is palindrome or not.	3	1
21	Develop a JavaScript program to print the pattern: 1 12 123 1234 etc... for N rows.	3	1
22	Write a JavaScript program to find the location of an element stored in an array using binary search,	3	2
23	Write a program to find the sum of diagonal elements of a 2D array.	3	1
24	Develop a JavaScript program to perform any five string operations on a string item.	3	2
25	Write a JavaScript program for event handling. Create four buttons – Add, Subtract, Multiply and Divide, and three text fields to accept two values and print the result in the last one when the corresponding button is clicked.	3	2
26	Write a program to print your personal details in an alert box. Use text fields, select box, radio buttons, check boxes and buttons to accept values.	3	2
27	Implement Client Side Scripts for Validating Web Form Controls using JavaScript.	3	1
28	Write a PHP program to find the sum of first N numbers.	4	1
29	Develop a PHP program to find the largest number from a set of numbers without using arrays.	4	1
30	Write a PHP program to sort a set of numbers.	4	1
31	Create a PHP program to search and find the location of a number using linear search.	4	1
32	Apply string operations to a string using PHP built-in string functions.	4	2
33	Develop a PHP program to find the BMI of a person. Use GUI controls to accept values.	4	3
34	Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.	5	3
35	Develop a web application for Airline Reservation System using PHP.	5	3

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	Thomas A Powell, HTML and CSS: The Complete Reference, 5 th Edition, McGraw-Hill, 2017 ISBN-10: 9780070701946, ISBN-13: 978-0070701946
2	Thomas A Powell, Fritz Schneider, JavaScript: The Complete Reference, 3rd Edition, Tata McGraw Hill, 2012. ISBN-10: 0071741208, ISBN-13: 978-0071741200

- | | |
|----------|---|
| 3 | Steve Suehring, Tim Converse, and Joyce Park, PHP6 and MySQL Bible, Wiley India Pvt Ltd, 2009
ISBN-10: 8126520221, ISBN-13: 978-8126520220 |
|----------|---|

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Day to day performance and documentation	16
Test and viva voce	16
Attendance	08
End Semester Examination (ESE)	60
Program logic and code	30
Output	20
Viva	10
Total	100

COURSE DESCRIPTION		
Course Code	21CA108	Course Credit: 2
Course Name	Data Structures Lab	
L-T-J-P	0-0-0-4	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To get practical exposure on basic data structures like arrays, linked list and its variants.
2	To implement the concepts of nonlinear data structures such as trees and its variants, graphs etc.
3	Understand the practical aspects of various data structures and implement the suitable for solving advanced computational problems.
4	To familiarise with algorithms and step by step approach in solving problems with the help of fundamental data structures.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Familiarize with the implementation of linear data structures such as array and linked list.	3
CO2	To implement the concept of stacks and queue data structures using arrays and linked list.	3
CO3	Implement the set and disjoint set data structures.	3
CO4	Acquire the practical aspects of advanced tree structures.	4
CO5	Implement advanced graph algorithms suitable for solving advanced computational problems.	4

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	3	-	1	-	-	-	-	-
CO2	3	2	2	-	1	-	-	-	-	-	-	-
CO3	2	2	3	2	1	-	1	-	-	-	-	-
CO4	2	3	3	2	1	-	1	-	-	-	-	-
CO5	3	3	2	1	2	-	1	-	-	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test	3 Hours

COURSE CONTENT

List of Laboratory Experiments		COs	Hours
1	Array insertion, deletion, searching, bubble sort	1	3
2	Merge two sorted arrays and store in a third array	1	2
3	Stack operations	2	2
4	Queue operations	2	2
5	Singly linked list – insertion, deletion	1	4
6	Singly linked stack - push, pop	2	2
7	Singly linked queue - push, pop	2	2
8	Doubly linked list - insertion, deletion	1	3
9	Circular linked list - insertion, deletion	1	3
10	Set data structure and set operations (union, intersection and difference) using bit string	3	3
11	Disjoint sets and the associated operations (create, union, find)	3	2
12	Binary search trees- insertion, search	4	3
13	B trees and its operations	4	4
14	Red Black trees and its operations	4	4
15	Graph traversal techniques (DFS and BFS)	5	3
16	Prim's algorithm for finding the minimum cost spanning tree	5	3
17	Kruskal's algorithm using the disjoint set data structure	5	3

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	G S Baluja, Data Structures – Through C, Dhanpat Rai & CO, ISBN: 9786500092332
2	Cormen T.H., Leiserson C.E., Rivest R.L. and Stein C., Introduction to Algorithms, 3 rd Edition, Prentice Hall India, New Delhi, ISBN: 9788120340077

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Day to day performance and documentation	16
Test and viva voce	16
Attendance	08
End Semester Examination (ESE)	60
Program logic and code	30
Output	20
Viva	10
Total	100

COURSE DESCRIPTION		
Course Code	21CA109	Course Credit: P/F
Course Name	Entrepreneurship and Innovations in Technology	
L-T-J-P	0-1-0-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	Enable students to develop their knowledge and understanding of entrepreneurship, innovation and product development, in general as well as for IT applications.
2	Enable students to develop their ability to generate and present a new business idea/business model/innovation in their field through introducing existing projects in the department.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	To evaluate and select new ideas through analysing them from a financial, technological, user-oriented and sustainable perspective.	5
CO2	To critically reflect on the significance of innovations and entrepreneurship for society in general and specifically for technology-based companies.	4
CO3	To reflect on self-development and learning process in the context of the development of a project.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	2	1	-	-	-	1
CO2	-	-	-	-	-	-	1	1	-	-	-	1
CO3	-	-	-	-	-	-	2	2	-	-	-	2
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	20 Hours
Internal Test	2 Hours

SYLLABUS

Practice of Innovation and entrepreneurship - Social Innovation and Social Entrepreneurship - Technology-based business models

COURSE CONTENT

Module - I	COs	Hrs.
Practice of Innovation and entrepreneurship - Systematic Entrepreneurship - Purposeful Innovation and the Sources for Innovative Opportunity - Entrepreneurial Management – Types of Innovations	1	8
Module - II	COs	Hrs.
Social Innovation and Social Entrepreneurship: Differences Between Social Innovation and Other Innovations - Sources of Social Innovation - Types of Social Innovation - Business Models of Social Enterprises	2	7
Module - III	COs	Hrs.
Technology-based business models - the objectives and contents of business plans - basic tools and methods for assessing, examining and analysing new ideas.	3	5

TEXT BOOKS

1	Luis Portales, Social Innovation and Social Entrepreneurship: Fundamentals, Concepts, and Tools, Springer International Publishing; Palgrave Macmillan, 2019, ISBN: 978-3-030-13455-6; 978-3-030-13456-3
2	Pamela Ryan, Impact Imperative: Innovation, Entrepreneurship, and Investing to Transform the Future, Greenleaf Book Group Press, 2019, ISBN: 1626346658, 9781626346659
3	José Machado, Filomena Soares, Germano Veiga, Innovation, Engineering and Entrepreneurship, Series: Lecture Notes in Electrical Engineering 505, Publisher: Springer International Publishing, 2019, ISBN: 978-3-319-91333-9, 978-3-319-91334-6

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	20
Internal Test	08
Assignment/Report	08
Attendance	04
End Semester Examination (ESE)	30
Objective type examination	30
Total	50

Semester – II

COURSE DESCRIPTION												
Course Code			21CA201					Course Credit: 4				
Course Name			Advanced Database Management Systems									
L-T-J-P			3-1-0-0									
Year of Introduction			2021									
COURSE OBJECTIVES												
1	To understand the basic concepts and terminology related to DBMS and Relational Database Design.											
2	To introduce the basic concepts including the structure and operation of the relational data model along with integrity constraints.											
3	To understand the design of a database system using normalization.											
4	Understand the concept of a database transaction and related database facilities, including concurrency control, backup, recovery, locking protocols, Security and Integrity.											
COURSE OUTCOMES (COs)										REVISED BLOOM'S TAXONOMY LEVEL		
At the end of the course students will be able to:												
CO1	Evaluate the fundamentals of relational database systems including data models, database architectures and ER features.									2		
CO2	Analyze and apply the different normalization techniques.									4		
CO3	Evaluate the basic issues of transaction processing and concurrency control.									2		
CO4	Comprehend the roles that databases play in organizations and familiarize with basic database storage, file organization, database accessing techniques.									2		
CO5	Familiar with the basics of query processing, object-oriented, distributed databases.									2		
CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	1	-	-	1	-	-	-	-	-
CO2	3	3	3	2	-	-	2	2	-	-	2	2
CO3	1	2	2	2	-	2	-	-	-	-	2	2
CO4	-	-	-	-	1	-	1	-	-	-	-	-
CO5	1	-	-	1	-	-	-	-	-	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- “-”												
COURSE IMPLEMENTATION CLOCK (IN HOURS)												
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes										1 Hour		
Course content delivery hours										48 Hours		
Internal Test (2 Assessment Tests of two-hour duration)										4 Hours		

SYLLABUS

Relational Databases - Database Design - Transaction Management and Concurrency Control - Data Storage and Querying - System Architecture, Object Oriented Databases, XML and NoSQL

COURSE CONTENT

Module-I		COs	Hrs.	ESE Marks
Module Title	Relational Databases			
Introduction - Purpose of Database System – Database System Applications - View of data: Data Abstraction - Instances and Schemas - Data Models – Database Architecture - Database Users and Administrators: Database Users and Interfaces - DBA		1	4	20%
Introduction to the Relational Model: Structure of Relational Database - Database Schema – Keys - The Relational Algebra: Fundamental Operations - Formal definition of the relational algebra The Entity-Relationship model: Entity Set, Relationship Set - Attributes – Constraints: Mapping cardinalities - Key Constraints, Participation Constraints		1	5	
E-R Diagrams: Basic structure, Complex attributes, Roles, Non binary relationship sets, Weak Entity Set, Extended ER Features: Specialization, Generalization, Attribute inheritance, Constraints on generalization, Aggregation		1	4	
Module-II		COs	Hrs.	ESE Marks
Module Title	Database Design			
Database Tables and Normalization – The Need for Normalization – The Normalization Process: Inference Rules for Functional Dependencies (proof not needed) - Conversion to First Normal Form, Conversion to Second Normal Form, Conversion to Third Normal Form - Improving the Design – Surrogate Key Considerations		2	5	20%
Higher Level Normal Forms: Boyce/Codd Normal Form - Fourth Normal Form - Join dependencies and Fifth Normal Form		2	3	
Module-III		COs	Hrs.	ESE Marks
Module Title	Transaction Management and Concurrency Control			
Transaction: Evaluating Transaction Results, Transaction Properties, Transaction Management with SQL, The Transaction Log – Concurrency Control: Lost Updates, Uncommitted Data - Inconsistent Retrievals - The Scheduler		3	4	20%
Concurrency Control with Locking Methods: Lock Granularity - Lock Types - Two Phase Locking to Ensure Serializability - Deadlocks		3	3	
Concurrency Control with Timestamping Methods: Wait/Die and Wait/Wound Schemes – Concurrency Control with Optimistic Methods Database Recovery Management: Transaction Recovery		3	2	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Data Storage and Querying			
RAID – File Organization – Organization of Records in Files – Indexing and Hashing: Basic concept - Ordered Indices		4	4	20%
B+ tree Index Files: Structure of a B+-Tree (structure only, algorithms not needed) - B tree index files – Query Processing: Overview - Selection Operation		4	4	

Module-V		COs	Hrs.	ESE Marks
Module Title	System Architecture, Object Oriented Databases, XML and NoSQL			
Distributed Databases: Homogeneous and Heterogeneous Databases - Distributed Data Storage - Distributed Transactions		5	2	20%
Object Based Databases: Overview - Complex Data types - Structured types and inheritance in SQL - Table Inheritance - Array and Multiset types in SQL - Object identity and reference types in SQL		5	5	
Next Generation Databases: Distributed Relational Databases – Nonrelational Distributed Databases - MongoDB Sharding and Replication - Hbase - Cassandra		5	3	

TEXT BOOKS

1	Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts, 6 th Edition, McGraw Hill Education, 2011, ISBN: 978-0-07-352332-3
2	Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 5 th Edition, Pearson Education, 2007, ISBN-13: 978-0133970777
3	Guy Harrison, Next Generation Databases: NoSQL, NewSQL, and Big Data, 1 st Edition, Apress, 14 December 2015, ISBN-13: 978-1-4842-1330-8
4	Rob, Peter and Carlos Coronel, Database Principles: Fundamentals of Design, Implementation and Management, 9 th Edition, 2011, ISBN-13: 978-0-538-46968-5

REFERENCE BOOKS

1	Ashutosh Kumar Dubay, Database Management Concepts, 1 st Edition, S.K. Kataria & Sons, 2012, ISBN-10: 8178740591
2	Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, 3 rd Edition, McGraw Hill, 2014, ISBN-10: 9339213114
3	Thomas M Connolly and Carolyn E Begg, Database systems- A Practical Approach to Design, Implementation and Management, 4 th Edition, Pearson Education, 2014, ISBN-13: 978-0321210258
4	P S Gill, Database Management Systems, 2 nd Edition, Wiley, 2019, ISBN-10: 9389307538.
5	A. Hoffer Jeffrey, V. Ramesh and Heikki Topi, Modern Database Management, 12 th Edition, Pearson Education, 2017, ISBN-13: 978-9386873262

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100

End Semester Examination Pattern

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

A	Total Pages:		2
Register No.:		Name:	

SAINTGITS COLLEGE OF ENGINEERING KOTTAYAM, KERALA

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)



SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA201		
Course Name:	Advanced Database Management Systems		
Max. Marks:	60	Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	Describe the role played by a Data Base Administrator.	1	2	3
2.	With the help of a diagram explain the different levels of data abstraction.	1	2	3
3.	Differentiate between BCNF and 3NF with an example.	2	4	3
4.	Explain functional dependency with suitable example.	2	2	3
5.	List the ACID properties of transaction.	3	1	3
6.	Define deadlock and discuss the strategies for managing deadlocks.	3	1	3
7.	Diagrammatically represent the basic steps in query processing.	4	3	3
8.	Explain the basic concept of hashing.	4	1	3
9.	Illustrate the different types of Distributed Databases.	5	2	3
10.	Define collection and document in MongoDB.	5	1	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	List the drawbacks of File Systems to store data.	1	1	6
OR				
12.	Explain the relational model concept and discuss the different relational model constraints.	1	2	6
MODULE II				
13.	Analyse the common anomalies found in databases. How can we eliminate it through normalization?	2	4	6
OR				
14.	Define Normalization. Explain 1NF, 2NF and 3NF in detail.	2	1	6
MODULE III				

15.	Define deadlock. How can we deal with deadlocks?	3	1	6
OR				
16.	Explain concurrency control with locking methods.	3	2	6
MODULE IV				
17.	Explain the various RAID levels with appropriate diagrams.	4	2	6
OR				
18.	Differentiate between Dense index and Sparse index with example.	4	4	6
MODULE V				
19.	Explain HBase and Cassandra.	5	2	6
OR				
20.	Explain about Next Generation Databases.	5	1	6

COURSE DESCRIPTION		
Course Code	21CA202	Course Credit: 4
Course Name	Web and Database Security	
L-T-J-P	3-1-0-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To give an overview of Information Security.
2	Provide an overview of database access controls.
3	Introduce the various issues that arise in securing applications and databases.
4	Study the state-of-the-art techniques for addressing the challenges in web and database security.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Comprehend the basic concepts of cryptography.	2
CO2	Study the web architecture and its applications.	2
CO3	Learn the concept in database security and access controls.	4
CO4	Identify the re-engineering possibilities while securing a database.	4
CO5	Learn to think about security when creating applications in a mobile environment.	4

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3	2	1	1	-	-
CO2	-	1	-	-	1	2	1	2	1	-	-	-
CO3	3	1	2	-	1	1	1	2	-	-	-	-
CO4	2	3	-	-	3	2	1	1	1	-	-	-
CO5	3	2	2	-	1	2	3	3	2	1	1	1
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test (2 Assessment Tests of two-hour duration)	4 Hours

SYLLABUS

Web Technology - Privacy and security for users and web server security - Database security and Access control - Security Re-engineering - Privacy Policies in a Mobile Environment

COURSE CONTENT

Module-I		COs	Hrs.	ESE Marks
Module Title	Web Technology			
Understanding the cryptography basics – Classical encryption techniques – Ceaser cipher - Playfair cipher - Rail fence transposition - Symmetric Key Algorithms - AES - Public Key Algorithms - RSA - Message Digest Functions		1	4	20%
The web security landscape - The Web Security Problem - Risk Analysis and Best Practices- The world wide web architecture - History and Terminology - A Packet's Tour of the Web		1	4	
Cryptography and web security –What Cryptography Can't Do - Legal restrictions on cryptography		1	1	
Digital identifications – Password – Biometrics – Digital signature - Digital certificates – CAs – PKI.		1	1	
Module-II		COs	Hrs.	ESE Marks
Module Title	Privacy and security for users and web server security			
The Web's War on your Privacy – Understanding Privacy - User-Provided Information - Log Files - Understanding Cookies		2	3	20%
Privacy Protecting Techniques and Technologies – Choosing a Good Service Provider - Picking a Great Password - Cleaning Up After Yourself - Avoiding Spam and Junk Email - Identity Theft - Blocking Ads and Crushing Cookies - Anonymous Browsing - Secure Email		2	5	
Backups and Antitheft - Using Backups to Protect Your Data - Preventing Theft		2	2	
Module-III		COs	Hrs.	ESE Marks
Module Title	Database security and Access control			
Recent Advances in Access Control - Introduction - Classical Access Control Models - Credential-Based Access Control - Overview of Policy Composition Solutions		3	3	20%
Access Control Models for XML - Introduction - Preliminary Concepts - XML Access Control Requirements - XML Access Control Models		3	4	
Database Issues in Trust Management and Trust Negotiation - Introduction to Trust Management - What is Trust Management? - Principal contributions to date in Trust.		3	3	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Security Re-engineering			
Security Re-engineering for Databases: Concepts and Techniques - Introduction - Insider Misuse and Anomaly Detection - Data and User Profiling - Access Path Model - Security Reconfiguration		4	3	20%
Database Watermarking for Copyright Protection - Introduction - Model - Numeric Types - Categorical Types		4	3	
Trustworthy Records Retention - Introduction - Problem Definition - Usage Scenario and Threat Model - Storage Architectures - Resistance to Physical		4	4	

Attack - Trustworthy Indexing - Trustworthy Migration - Trustworthy Deletion - Open Problems				
Module-V		COs	Hrs.	ESE Marks
Module Title	Privacy Policies in a Mobile Environment			
Introduction - System Architecture for a Mobile Application Environment - Authorization Model in a Mobile Environment - Unified Index for Authorizations and Profiles - Unified Index for Authorizations and Moving Objects - Unified Index for Authorizations, Moving Objects and Profiles - Open Issues		5	8	20%

TEXT BOOKS

1	S Garfinkel and G S pafford, Web Security, Privacy and Commerce, 2 nd Edition, O'Reilly, 2002, ISBN: 978-0-596-00045-5
2	M Gertz and S Jajodia, Handbook on Database security applications and trends, Springer, 2008, ISBN-13: 978-0-387-48532-4
3	M Bishop, Computer Security: Art and Science, Addison Wesley, 2002, ISBN-13: 978-0201440997

REFERENCE BOOKS

1	J Scambray, M Shema and C Sima, Hacking Exposed Web Applications, 2 nd Edition, McGraw-Hill Education, 2006, ISBN-13: 978-0072262995
2	B Sullivan and V Liu, Web Application Security, A Beginners Guide, McGraw-Hill Education, 2012, ISBN-13 : 978-0071776165
3	A Basta, MZgola, Database Security, Cengage Learning, 2011, ISBN-13: 978-1435453906
4	A Silberschatz H F, Korth S and Sudarshan, Database system concepts , 7 th Edition, McGraw-Hill, 2019 , ISBN: 9780078022159
5	R. Elmasri and S. Navathe, Fundamentals of Database Systems, 7 th Edition, Pearson, 2016, ISBN-13: 978-0-13-397077-7

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100

End Semester Examination Pattern

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

B	Total Pages:	2
Register No.:	Name:	

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)



SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR



Course Code:	21CA202
Course Name:	Web and Database Security
Max. Marks:	60
Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	What are the primary facets of today's web security problem?	1	1	3
2.	Discuss the working of DNS.	1	2	3
3.	Briefly explain the version of RAID.	2	2	3
4.	What is identity theft? List the ways to protect yourself from identity theft.	2	1	3
5.	Write a short note on PRUNES negotiation strategy.	3	2	3
6.	Discuss, 'authorization based on delegation of privileges'. Why is it important?	3	1	3
7.	List the NIST components of security audit criteria that can be adopted to database systems, with a neat figure.	4	1	3
8.	Explain the principle of 'least privilege' in security reconfiguration.	4	4	3
9.	Write about different request scenarios based on the mobility of requesters and resources, in authorization model in a mobile environment.	5	2	3
10.	Explain the find-auth method in authorization log of an SPPF-tree.	5	4	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	Discuss symmetric key and asymmetric key encryption algorithms.	1	2	6
OR				
12.	Explain offline and online encryption systems.	1	4	6
MODULE II				
13.	'Cookies can be used to improve privacy or to weaken it'. Discuss the pros and cons associated with cookies in your personal computer.	2	4	6
OR				
14.	Why should you back-up your data? Explain the security measures to keep your back-up safe.	2	2,3	6

MODULE III				
15.	Discuss XML access control models.	3	4	6
OR				
16.	Discuss the principal contributions to date in trust management.	3	4	6
MODULE IV				
17.	Elaborate the access path model, which helps in accomplishing a security re-engineering in a production-type database setup.	4	2	6
OR				
18.	Analyse the solutions for resilient Information Hiding for relational data.	4	3	6
MODULE V				
19.	Explain the system architecture for a mobile application environment with a neat diagram.	5	2	6
OR				
20.	Explain the approaches for unified index scheme for authorizations and moving objects in enforcement of mobile security and privacy.	5	2	6

COURSE DESCRIPTION												
Course Code		21CA203-A						Course Credit: 4				
Course Name		Enterprise Resource Planning										
L-T-J-P		3-1-0-0										
Year of Introduction		2021										
COURSE OBJECTIVES												
1	To make students to build an understanding of the fundamental concepts of ERP systems, their architecture and working of different modules in ERP.											
2	To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning technology.											
3	To focus on a strong emphasis upon practice of theory in applications and practical oriented approach.											
4	To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.											
5	To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills.											
COURSE OUTCOMES (COs)										REVISED BLOOM'S TAXONOMY LEVEL		
At the end of the course students will be able to:												
CO1	Describe basic concepts of ERP systems and its functioning.									2		
CO2	Make basic use of Enterprise software and its role in integrating business functions.									3		
CO3	Define and describe the fundamentals of hardware, software, data communications and systems related to the management activities of an organization.									1		
CO4	Gain Knowledge on Functional Fit Analysis, Risk Analysis and Cost Benefit Analysis.									2		
CO5	Develop skills necessary for building and managing relationships with customers and stakeholders.									3		
CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	1	2	-	1	1	1
CO2	2	3	2	2	1	1	-	-	-	-	-	-
CO3	1	2	3	3	1	1	-	1	-	-	-	-
CO4	1	1	2	-	1	-	-	-	-	-	-	-
CO5	1	2	2	1	1	-	-	-	-	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- “-”												
COURSE IMPLEMENTATION CLOCK (IN HOURS)												
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes									1 Hour			
Course content delivery hours									48 Hours			
Internal Test (2 Assessment Tests of two-hour duration)									4 Hours			

SYLLABUS

Introduction to ERP and functioning of ERP Systems – ERP Parties and IT architecture – ERP Evaluation and Implementation – Functional Fit Analysis - Risk Analysis and Cost Benefit Analysis – ERP and Open Source Software - Corporate Governance and Shared Services

COURSE CONTENT

Module - I		COs	Hrs.	ESE Marks
Module Title	Introduction to ERP and functioning of ERP Systems			
Why ERP? – The main characteristics of ERP – Organisations that use ERP – Expected benefits from ERP – Impact of ERP		1	3	20 %
The functioning of ERP Systems – The Value Chain and the Supply Chain – The predecessors of ERP – The first ERP Systems		1	3	
ERP Extensions: Data Integration for value chains - Data Integration in the supply chain		1	3	
Module - II		COs	Hrs.	ESE Marks
Module Title	ERP Parties and IT architecture			
Parties in the ERP Market Place – ERP Software suppliers – Implementation partners – Application Service Providers		2	4	20 %
ERP and IT architecture – The logical architecture of an ERP system – The elements of a physical IT architecture – ERP on a mainframe architecture – ERP on a client-server architecture – ERP on a browser architecture		2	5	
Module - III		COs	Hrs.	ESE Marks
Module Title	ERP Evaluation and Implementation			
Principles of an ERP Implementation– Phases in the ERP lifecycle		3	2	20 %
The preselection of suppliers - implementation partners and application service providers		3	3	
The sourcing basis: turn-key or do-it-yourself – Model-Building Strategy – Go live strategy		3	3	
Module - IV		COs	Hrs.	ESE Marks
Module Title	Functional Fit Analysis , Risk Analysis and Cost Benefit Analysis			
Functional Fit Analysis– Significance of the functional fit analysis – A method for functional fit analysis – Approach for functional fit analysis		4	3	20 %
Risk Analysis– Significance of the risk analysis – A method for risk analysis – Approach for risk analysis		4	3	
Cost Benefit Analysis – Significance of the cost benefit analysis – A method for cost benefit analysis – Approach cost benefit analysis		4	3	
ERP ex ante evaluation – an example		4	2	
Module - V		COs	Hrs.	ESE Marks
Module Title	ERP and Open Source Software, Corporate Governance and Shared Services			
ERP and Open Source Software: A brief introduction on open source software – ERP and open source software – Implementation Strategy		5	3	20 %
ERP and Corporate Governance: A brief introduction on corporate governance legislation– Core concepts in internal control – ERP and internal control		5	3	
ERP and Shared Services: A brief introduction on Shared service centres– ERP and shared service centres – Implementation strategy		5	3	
Criticism of ERP		5	2	

TEXT BOOKS

1	Prof. Dr. Lineke Sneller RC, A Guide to ERP: Benefits, Implementation and Trends, 1 st Edition, Prof. dr. Lineke Sneller RC & bookboon.com, 2014, ISBN: 978-87-403-0729-0
2	Sumner Mary, Enterprise Resource Planning, 1 st Edition, Pearson education, 2006, ISBN: 81-317-0240-5
3	Taylor & David A, Supply Chains: A managers guide, 1 st Edition, Pearson education, 2004, ISBN: 978-0321720696

REFERENCE BOOKS

1	Rahul V & Altekhar, Enterprise wide resource planning: Theory and practice, 1 st Edition, Prentice Hall of India, 2005, ISBN: 81-203-2633-4
2	Garg Vinod K & Venkitakrishnan N.K, Enterprise resource planning, 2 nd Edition, Prentice Hall of India, 2006, ISBN: 81-203-2254-1
3	Handfield R. B & Nichols. Ernest L., Introduction to supply chain management, 1 st Edition, Prentice Hall of India, 2006, ISBN: 81-203-2753-5
4	Ellen Monk & Bret Wagner, Concepts in Enterprise resource planning, 3 rd Edition, Cengage learning, 2009, ISBN: 9781111820398
5	Vinod Kumar Garg, Nk Venkitakrishnan, Erpware Erp Implementation Framework, 1 st Edition, Prentice Hall of India, 1999, ISBN: 9788120315525

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100

End Semester Examination Pattern

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

C	Total Pages:		2
Register No.:		Name:	

SAINTGITS COLLEGE OF ENGINEERING KOTTAYAM, KERALA

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)



SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA203-A		
Course Name:	Enterprise Resource Planning		
Max. Marks:	60	Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	Define ERP Systems.	1	1	3
2.	What is supply chain?	1	2	3
3.	Explain Application Service Providers.	2	2	3
4.	List the elements of a physical IT architecture and explain.	2	1	3
5.	What are the factors that are critical for the success of the ERP implementation?	3	2	3
6.	Write down the phases in an ERP lifecycle.	3	1	3
7.	Explain the significance of the functional fit analysis.	4	2	3
8.	What are the different approaches for risk analysis?	4	2	3
9.	Which are the two important differences exist between proprietary and open source ERP systems?	5	1	3
10.	List and explain the two main characteristics of ERP.	5	1	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	How ERP supports the management and operations of an organization?	1	4	6
OR				
12.	Explain in detail about the first fully-fledged ERP systems.	1	2	6
MODULE II				
13.	Who are the main parties in the ERP market place? List and Explain each.	2	1	6
OR				
14.	Describe ERP on Client-Server Architecture.	2	2	6
MODULE III				
15.	List and explain any two principles of the ERP implementation.	3	1	6
OR				

16.	Explain (i) Model-Building Strategy (ii) Go - Live Strategy	3	2	6
MODULE IV				
17.	Explain functional fit analysis using Exploration.	4	2	6
OR				
18.	What are the four steps of cost benefit analysis?	4	2	6
MODULE V				
19.	Explain the implementation strategies for shared services combined with ERP.	5	2	6
OR				
20.	Describe corporate governance, internal control and the way in which ERP used to improve internal control.	5	2	6

COURSE DESCRIPTION		
Course Code	21CA203-B	Course Credit: 4
Course Name	Agile Project Management	
L-T-J-P	3-1-0-0	
Year of Introduction	2021	
COURSE OBJECTIVES		
1	To realize the need for a change in traditional software development process.	
2	To introduce the agile principles.	
3	To learn the agile framework.	
4	To manage a project with agile methods.	

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Define the basics of Agile fundamentals, frameworks and principles.	1
CO2	Outline the working using Agile methodology.	2
CO3	Relate the skills of management in Agile environment.	2
CO4	Apply the Agile testing and Review techniques.	3
CO5	Experiment with the benefits, metrics and resources of Agile project management.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	3	-	2	-
CO3	3	2	1	-	-	-	-	3	1	-	-	-
CO4	3	2	3	2	2	-	-	-	-	-	-	-
CO5	3	2	2	2	1	1	1	-	-	-	-	1
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test (2 Assessment Tests of two-hour duration)	4 Hours

SYLLABUS

Understanding Agile - Working in Agile - Managing in Agile - Ensuring Agile success - The part of Tens.

COURSE CONTENT

Module - I		COs	Hrs.	ESE Marks
Module Title	Understanding Agile			
Modernizing project management - The Agile manifesto		1	1	20%
Agile Principles - Benefits and Challenges of Agile		1	3	
Agile Frameworks - Using Agile Methods		1	2	
Agile Fundamentals		1	2	
Module - II		COs	Hrs.	ESE Marks
Module Title	Working in Agile			
Defining the product vision and product roadmap		2	1	20%
Planning releases and sprints		2	3	
Working through the day		2	2	
Showcasing work and incorporating feedback		2	2	
Preparing for release		2	2	
Module - III		COs	Hrs.	ESE Marks
Module Title	Managing in Agile			
Managing scope and procurement		3	2	20%
Managing time and cost		3	3	
Managing team dynamics and communication		3	3	
Managing quality assurance and risk		3	2	
Module - IV		COs	Hrs.	ESE Marks
Module Title	Ensuring Agile success			
Building a foundation		4	2	20%
Commitment of Organization and of individuals		4	1	
Choosing the right project team members		4	2	
Creating an environment that works for Agile		4	2	
Support Agile initially and overtime		4	3	
Module - V		COs	Hrs.	ESE Marks
Module Title	The part of Tens			
Key benefits of Agile project management		5	3	20%
Key metrics for Agile Project management		5	4	
Key resources for Agile Project management		5	3	

TEXT BOOKS

1	Mark C Layton, Agile Project Management For Dummies, 1 st Edition, John Wiley & Sons, Inc., 2012, ISBN: 978-1-118-02624-3
2	Ed Stark, Agile Project Management Quick Start Guide: The Simplified Beginners Guide To Agile Project Management, 2 nd Edition, ClydeBank Business, 2014, ISBN-10: 1502393468; ISBN-13: 978-1502393463

REFERENCE BOOKS

1	Mark C Layton, Steven J. Ostermiller, Dean J. Kynaston, Agile Project Management For Dummies, 3 rd Edition, John Wiley & Sons, Inc., 2020, ISBN: 978-1-119-67705-5
2	Jim Highsmith, Agile Project Management: Creating Innovative Products, 2 nd Edition, Pearson Education, 2009, ISBN: 0321659171, ISBN:9780321659170
3	Roman Pichler, Agile Product Management with Scrum: Creating Products that Customers Love, 1 st Edition, Addison-Wesley, 2010, ISBN-10: 0321605780; ISBN-13: 978-0321605788
4	Ken Schwaber, Agile Project Management with Scrum (Developer Best Practices), 1 st Edition, Microsoft Press US, 2004, ISBN-10: 073561993X; ISBN-13: 978-0735619937
5	Sohel Akhter, Agile Project Management, 1 st Edition, Endeavor Printing, 2020, ISBN-10: 1643162543; ISBN-13: 978-1643162546

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100

End Semester Examination Pattern

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

C	Total Pages:		2
Register No.:		Name:	

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SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA203-B
Course Name:	Agile Project Management
Max. Marks:	60
Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	What are the benefits of Agile?	1	1	3
2.	List the challenges of Agile methodology.	1	4	3
3.	Write notes on Sprint review meeting.	2	1	3
4.	What is release Sprint?	2	1	3
5.	How to manage the changes in scope?	3	2	3
6.	What is proactive quality?	3	1	3
7.	How to get commitment from individuals? Explain.	4	2	3
8.	Identify the need for a product roadmap.	4	3	3
9.	List the key resources for Agile project management.	5	4	3
10.	How to track defects?	5	2	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	Explain Agile Principles in detail.	1	2	6
OR				
12.	Elaborate on Agile frameworks.	1	2	6
MODULE II				
13.	Explain the steps that are to be taken for a Sprint Retrospective.	2	2	6
OR				
14.	Explain the steps in preparing for the release.	2	2	6
MODULE III				
15.	How to manage the procurement in Agile? Explain.	3	2	6
OR				
16.	Write notes on managing cost in Agile.	3	1	6
MODULE IV				

17.	How to choose the right project team members? Explain.	4	2	6
OR				
18.	Explain the points to consider while creating a good Agile project environment.	4	2	6
MODULE V				
19.	Explain the metrics for Agile project management.	5	2	6
OR				
20.	Explain the benefits of Agile project management.	5	2	6

COURSE DESCRIPTION		
Course Code	21CA203-C	Course Credit: 4
Course Name	Distributed Systems	
L-T-J-P	3-1-0-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To impart awareness on modern distributed systems.
2	To get knowledge in distributed architecture, naming, synchronization, consistency and replication, NFS and Distributed Mutual Exclusion principles.
3	To examine current popular distributed systems and Middleware Technologies for Open and Global Distributed Systems.
4	To get introduced to distributed shared memory systems- IVY and Munin.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Manage performance, reliability and other issues while designing System Models in distributed environment.	2
CO2	Focus on distributed objects and synchronization.	2
CO3	Apprehend naming, distributed communication and Mutual Exclusion principles.	2
CO4	Design Distributed File Systems and Distributed Algorithms.	3
CO5	Analyse Shared Memory Techniques and Middleware Technologies for Open and Global Distributed Systems.	4

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	1	-	2	-	-	1	-	-
CO2	3	3	1	1	2	-	-	-	1	-	-	-
CO3	3	2	3	2	-	-	-	-	-	1	-	-
CO4	2	2	3	-	2	-	1	2	-	1	-	-
CO5	2	2	1	-	3	2	1	-	-	-	2	2
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test (2 Assessment Tests of two-hour duration)	4 Hours

SYLLABUS

Introductory concepts of Distributed Systems - System models - Distributed Objects - Time and Global States - Name Services - Coordination and Agreement - Distributed File Systems - Distributed Algorithms - Distributed Shared Memory - Middleware Technologies for Open and Global Distributed Systems – CORBA

COURSE CONTENT

Module-I		COs	Hrs.	ESE Marks
Module Title	Introduction and System Models			
Introduction: Definitions - Models and Enabling Technologies- Relation to parallel systems - Message-passing systems versus shared memory systems – Examples of Distributed Systems - Resource Sharing and the Web - Challenges		1	6	20%
System Models: Introduction - Architectural Models - Fundamental Models		1	3	
Module-II		COs	Hrs.	ESE Marks
Module Title	Distributed Objects, Time and Global States			
Distributed Objects and Remote Invocation: Introduction-Communication between distributed objects - Remote procedure calls - Events and notifications Case study: Java RMI		2	6	20%
Time and Global States: Introduction – Clocks - Events and Process States - Synchronizing physical clocks - Logical time and logical clocks - Global states - Distributed debugging		2	5	
Module-III		COs	Hrs.	ESE Marks
Module Title	Name Services, Coordination and Agreement			
Name Services: Introduction - Name Services and the Domain Name System - Directory Services Case Study: Global Name Service		3	5	20%
Coordination and Agreement: Introduction - Distributed Mutual exclusion - Multicast communication -Consensus and related problems		3	4	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Distributed File Systems and Distributed Algorithms			
Distributed File Systems: Introduction - File Service Architecture Case Study 1: Sun Network File System Case Study 2: The Andrew File System.		4	6	20%
Distributed Algorithms: Snapshots - Leader election		4	3	
Module-V		COs	Hrs.	ESE Marks
Module Title	Distributed Shared Memory and Middleware Technologies			
Distributed Shared Memory: Introduction - Design and Implementation Issues - Sequential Consistency - Release Consistency Case Study1 : IVY Case Study2 : Munin		5	5	20%
Middleware Technologies for Open and Global Distributed Systems: CORBA – Jini- Mobile Agents Case Study: CORBA		5	5	

TEXT BOOKS

1	Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems: Principles and Paradigms, 2 nd Edition, Prentice Hall of India, 2015, ISBN-10: 933254980X, ISBN-13: 978-9332549807
2	Sukumar Ghosh , Distributed Systems-An Algorithm Approach, 2 nd Edition, Chapman & Hall / CRC, Taylor & Francis Group, 2015, ISBN: 9780367659127

REFERENCE BOOKS

1	George Coulouris, J Dollimore and Tim Kindberg, Distributed Systems: Concepts and Design, 5 th Edition, Pearson Education, 2012, ISBN-13: 978-0132143011, ISBN-10: 0132143011.
2	Mukesh Singhal and Niranjana Shivaratri ,Advanced Concepts in Operating Systems, Indian Edition, Tata Mcgraw Hill Education Pvt. Limited, 2017, ISBN-10:0070472688, ISBN-13: 978-0070472686
3	Pradeep K Sinha, Distributed Operating Systems: Concepts and Design, Prentice Hall of India, 1996, ISBN-10: 0780311191, ISBN-13: 978-0780311190
4	Tanenbaum Andrew, Modern Operating Systems, 2 nd Edition, Prentice Hall Upper Saddle River, NJ, 2001, ISBN: 9780130313584
5	Hagit Attiya, Jennifer Welch, Distributed Computing: Fundamentals, Simulations, and Advanced Topics, 2 nd Edition, Wiley-Interscience, 2004, ISBN-10: 9780471453246, ISBN-13: 978-0471453246

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100

End Semester Examination Pattern

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

C	Total Pages:	2
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SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA203-C
Course Name:	Distributed Systems
Max. Marks:	60
Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	In what aspects distributed systems are better than centralized systems? Give examples of two applications for which distributed systems will be more suitable.	1	3	3
2.	Discuss the resource sharing challenges in Web.	1	3	3
3.	What is Distributed Debugging? Explain.	2	2	3
4.	What are distributed objects? Discuss various methods to remotely invoke these objects.	2	2	3
5.	Mention the factors that evaluate the performance of communication channels.	3	1	3
6.	What are the criteria for evaluating the performance of a mutual exclusion algorithm	3	1	3
7.	With an example, describe the working of ring based election algorithm.	4	3	3
8.	How does Andrew File System ensure that the cached copies of files are up-to-date?	4	4	3
9.	Write notes on Distributed shared memory systems.	5	2	3
10.	Discuss Jini Architecture.	5	4	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	Explain with an example the distributed service as a utility.	1	2	6
OR				
12.	Discuss the Architectural System Model in detail.	1	2	6

MODULE II					
13.	Describe the major design issues for RPC. Illustrate with Java RMI.		2	4	6
OR					
14.	Write notes on i)Physical clock ii)Logical clock iii)Clock synchronization		2	2	6
MODULE III					
15.	a)	Briefly explain different types of navigations used for name resolution.	3	2	3
	b)	Discuss the role of DNS for home based approach to locate mobile hosts	3	2	3
OR					
16.	Explain a multicast based mutual exclusion algorithm.		3	2	6
MODULE IV					
17.	Differentiate between NFS and AFS. Explain both file systems in detail.		4	2	6
OR					
18.	Describe the working of Snapshots algorithm with an example.		4	3	6
MODULE V					
19.	a)	How shared memory is implemented in distributed system?	5	3	2
	b)	Describe Sequential Consistency Model in detail.	5	2	4
OR					
20.	Explain CORBA Architecture.		5	3	6

COURSE DESCRIPTION		
Course Code	21CA203-D	Course Credit: 4
Course Name	Computational Intelligence	
L-T-J-P	3-1-0-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To introduce students with computational intelligence as a successor of artificial intelligence.
2	To familiarize students with the concepts of genetic algorithms.
3	To understand students with the applications of computational intelligence in areas like classification, pattern matching, and data mining.
4	To introduce the students with the basic tools and techniques in computational intelligence such as neural networks and genetic algorithms from an application perspective.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Narrate biological motivation behind computational intelligence, difference between soft computing and hard computing.	1
CO2	Distinguish between the evolutionary programming and genetic programming.	2
CO3	Apply neural networks to complete tasks in classification problems.	3
CO4	Apply fuzzy principles to tackle real-time issues.	3
CO5	Describe the relationship between genetic algorithms and fuzzy systems.	2

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	-	-	-	2	-	-	-
CO2	2	2	2	2	1	-	-	-	2	-	-	-
CO3	3	2	3	3	3	-	-	-	2	-	-	-
CO4	3	2	3	3	3	-	-	-	2	-	-	-
CO5	2	3	3	3	3	-	-	-	2	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test (2 Assessment Tests of two-hour duration)	4 Hours

SYLLABUS

Foundational principles of Computational Intelligence – Evolutionary Computation and Programming – Genetic Algorithms and programming – Neural Network Systems and Paradigms – Fuzzy Sets and Fuzzy Logic – Approximate Reasoning Theory – Computational Intelligence Implementations - Computational Intelligence and Data Mining.

COURSE CONTENT

Module-I		COs	Hrs.	ESE Marks
Module Title	Foundations			
Definitions – Biological Basis for Neural Networks – Biological Basis for Evolutionary Computation		1	2	20%
Behavioural Motivations for Fuzzy Logic – Myths about Computational Intelligence –Computational Intelligence Application Areas Adaptation		1	3	
Adaptation and Learning		1	2	
Self-Organization and Evolution – Computational Intelligence as Adaptation and Self-Organization		1	2	
Ability to Generalize – Computational Intelligence and Soft Computing <i>versus</i> Artificial Intelligence and Hard Computing		1	1	
Module-II		COs	Hrs.	ESE Marks
Module Title	Evolutionary Computation Concepts			
History of Evolutionary Computation		2	2	20%
Evolutionary Computation Overview – Genetic Algorithms		2	4	
Evolutionary Programming – Evolution Strategies		2	4	
Genetic Programming – Particle Swarm Optimization		2	3	
Module-III		COs	Hrs.	ESE Marks
Module Title	Neural Network Systems and Paradigms			
What are neural networks – Neural Network Components and Terminology – Neural Network Topologies		3	4	20%
Comparing Neural Networks and Other Information Processing Methods – Pre-processing and Post-processing		3	4	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Fuzzy Logic Systems Concepts			
Fuzzy Sets and Fuzzy Logic – Theory of Fuzzy Sets		4	3	20%
Approximate Reasoning		4	3	
A general approach to fuzzy control		4	1	
Module-V		COs	Hrs.	ESE Marks
Module Title	Computational Intelligence Implementations			
Implementation Issues		5	3	20%
Understanding the Fuzzy Evolutionary Fuzzy Rule System Implementation		5	4	
Choosing the Best Tools – Applying Computational Intelligence to Data Mining		5	3	

TEXT BOOKS

1	Russel Eberhart, Yuhui Shi, Computational Intelligence - Concepts to Implementations, 1 st Edition, Morgan Kauffmann Publishers, 2011, ISBN: 978-1558607590
2	Leszek Rutkowski, Computational Intelligence: Methods and Techniques, 8 th Edition, Springer, 2008, ISBN: 978-3540762874
3	Guanrong Chen, Trung Tat Pham, Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems, 1 st Edition, CRC Press, 2000, ISBN: 978-0849316586

REFERENCE BOOKS

1	Melanie Mitchell, Introduction to Genetic Algorithms, Reprint Edition, MIT Press, 1998, ISBN: 978-0262631853
2	Tom M. Mitchell, Machine Learning, 1 st Edition, McGraw Hill, 2017, ISBN: 978-1259096952
3	Simon Haykin, Neural Networks: A Comprehensive Foundation, Subsequent edition (July 1, 1998), Prentice Hall, 1997, ISBN: 978-0138958633
4	Timothy J. Ross, Fuzzy Logic with Engineering Applications, 3 rd Edition, McGraw Hill, 2011, ISBN: 978-8126531264
5	Davis E. Goldberg, Genetic Algorithms: Search, Optimization and Machine Learning, 13 th Edition, Addison Wesley Publishing Company, 1989, ISBN:978-0201157673

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100

End Semester Examination Pattern

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

C	Total Pages:	2
Register No.:	Name:	

SAINTGITS COLLEGE OF ENGINEERING KOTTAYAM, KERALA

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)



SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA203-D
Course Name:	Computational Intelligence
Max. Marks:	60
Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	With a conceptual diagram, spell out your idea on a biological neuron.	1	1	3
2.	Compare, supervised adaptation and unsupervised adaptation.	1	3	3
3.	Give your understanding about evolutionary programming.	2	2	3
4.	What is particle swarm optimization?	2	1	3
5.	Write about the operations that can be performed by a neural network.	3	2	3
6.	Formulate the general activation function in a neural network.	3	3	3
7.	Brief on how you get the functionality of AND operation in fuzzy sets.	4	3	3
8.	Give your idea on fuzzy controllers.	4	2	3
9.	Draw the relationship between the fuzzy system and the genetic algorithm in the evolutionary fuzzy rule system.	5	2	3
10.	Do a comparative study of fuzzy systems and neural networks to select the best tools in computational intelligence.	5	3	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	Write about the possible application areas of computational intelligence.	1	1	6
OR				
12.	Give an approximate representation containing the relationships among components of intelligent systems.	1	1	6
MODULE II				
13.	How can we apply evolutionary programming to finite state machines used for prediction?	2	3	6
OR				
14.	Discuss about genetic programming in detail.	2	2	6
MODULE III				

15.	Explain a neural network's processing element activation functions.	3	2	6
OR				
16.	Describe the various topologies of neural network in detail.	3	3	6
MODULE IV				
17.	With proper examples, explain approximate reasoning in fuzzy set theory.	4	2	6
OR				
18.	Explain about usual defuzzification methods.	4	2	6
MODULE V				
19.	Give the ga() routine in the fuzzy evolutionary fuzzy rule system implementation.	5	3	6
OR				
20.	Give the diagram of computational intelligence data mining system and explain how both are related.	5	1	6

COURSE DESCRIPTION												
Course Code			21CA203-E					Course Credit: 4				
Course Name			Organizational Behaviour									
L-T-J-P			3-1-0-0									
Year of Introduction			2021									
COURSE OBJECTIVES												
1	To make the students understand the importance of human resources in an organization.											
2	To enable students to comprehend individual behaviour in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, Decision making, and motivational theories.											
3	To understand group behaviour and what applications are needed in organizations to handle communication, leadership, power and politics, conflict, and negotiations.											
4	To provide the students an analysis of demand for human resources in the present and future scenario and the need for change.											
5	To provide a correlation of the past and present practices and anticipate methodologies and solutions for uncertainties in future.											
COURSE OUTCOMES (COs)									REVISED BLOOM'S TAXONOMY LEVEL			
At the end of the course students will be able to:												
CO1	Comprehend individual behaviour in organization.								2			
CO2	Demonstrate the applications of organizational behaviour in handling human resources.								2			
CO3	Apply different practices to solve organization issues and problems.								3			
CO4	Develop teamwork and build up a constructive interpersonal relationship.								3			
CO5	Evaluate personal leadership style and the leadership needs of business.								4			
CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	-	-	2	-	2	2	-	1	1
CO2	2	2	-	-	-	1	2	3	3	-	3	1
CO3	2	2	-	-	-	1	2	3	3	-	3	1
CO4	2	2	-	-	-	1	-	3	3	-	3	-
CO5	2	2	1	-	-	2	-	2	2	-	1	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- “-”												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test (2 Assessment Tests of two-hour duration)	4 Hours

SYLLABUS

Introductory Concepts of Organization Behaviour – Importance of Communication in OB – Role of Social Networks in OB – Theory of Behaviour and Culture – Impact of Culture in OB – Foundations of Individual Behaviour – Theory of Motivation and Leadership – Decision Making Process – Team Development – Conflict Management and Organizational Development – Challenges of OB in present scenario

COURSE CONTENT

Module-I		COs	Hrs.	ESE Marks
Module Title	Introduction			
Introduction to Organizational Behaviour – Definition and its relevance		1	2	20%
Approaches to Organizational Behaviour		1	2	
Importance of Communication in Organizational Behaviour (Informal and formal communication) – Cross Cultural Communication – Its issues		1	4	
Social Networks – Role in communication and Organizational Behaviour		1	2	
Module-II		COs	Hrs.	ESE Marks
Module Title	Theory of Behaviour and Culture			
Culture and its influence in Organizational Behaviour		2	2	20%
Personality – Meaning, Formation, Determinants, Traits of Personality – Personality Attributes Influencing Organizational Behaviour		2	2	
Attitude and Perception – Relation between Attitude and Behaviour – Process of Perception – Factors influencing Perception		2	3	
Foundations of Individual Behaviour – Skills – Intellectual Skills, Social Skills, Personal Skills - Expert and Technical Skills		2	3	
Module-III		COs	Hrs.	ESE Marks
Module Title	Theory of Motivation and Leadership			
Motivation Meaning – Theories of motivation – Two-factor theory, Theory X and Y – Leadership Meaning – Styles of Leadership		3	5	20%
Ethical Leadership – Decision making process and moral dilemma		3	5	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Team Development			
Group Dynamics and Team Development – Definition and importance.		4	2	20%
Types of Groups – Group Formation – Group Cohesion and Interpersonal Relationship		4	3	
Transcultural issues in Organization		4	3	
Module-V		COs	Hrs.	ESE Marks
Module Title	Conflict Management and Organizational Development			
Organizational Conflict and Negotiations – Types of Conflict – Functional and Dysfunctional Organizational Conflicts – Resolution of Conflict		5	5	20%
Organizational Development – Concept - Need for Change - Resistance to Change		5	3	
Challenges and Opportunities of Organizational Behaviour in present scenario		5	2	

TEXT BOOKS

1	Greenberg, J, Managing Behaviour in Organizations, 4 th Edition, Prentice Hall, 2004, ISBN: 0-13-144746-7
2	Stephen P. Robins, Organisational Behaviour, 11 th Edition, PHI Learning / Pearson Education, 2006, ISBN: 978-8120328754.
3	Fred Luthans, Organisational Behaviour, 11 th Edition, McGraw Hill, 2006, ISBN: 978-0073530352

REFERENCE BOOKS

1	Schermerhorn, Hunt and Osborn, Organisational Behaviour, 9 th Edition, John Wiley, 2004, ISBN: 978-0471681700
2	Bhattacharya, D.K., Organizational Behaviour, Oxford University Press, 2009, ISBN: 978-0195695946
3	Udai Pareek, Understanding Organisational Behaviour, 3 rd Edition, Oxford University Press, 2011, ISBN: 978-0198070733
4	Hellrigal, Slocum, Organisational Behaviour, 11 th Edition, Cengage Learning, 2007, ISBN: 978-0324686487
5	Ivancevich, Konopaske & Maheson, Organisational Behaviour & Management, 7 th Edition, Tata McGraw Hill, 2008

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Internal Test - I	10
Internal Test - II	10
Assignments / Tutorial / Seminars etc.	12
Attendance	08
End Semester Examination (ESE)	60
Total	100

End Semester Examination Pattern

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

C	Total Pages:	2
Register No.:	Name:	

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SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA203-E
Course Name:	Organizational Behaviour
Max. Marks:	60
Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	Define OB and explain the functions of OB.	1	1	3
2.	Explain communication and state the types of communication prevailing in an organization.	1	2	3
3.	Define skill and types of skills required in an organization.	2	1	3
4.	Brief on attitude and perception and how they influence the productivity of a person in an organization.	2	2	3
5.	How to build up motivation in a person?	3	1	3
6.	Does the process of planning and organizing require a good leader?	3	1	3
7.	Define group dynamics.	4	1	3
8.	In what way, group cohesiveness is formed.	4	1	3
9.	Negotiation is a vital part of conflict resolution, critically examine this statement.	5	4	3
10.	'Without change, the development of an organization does not occur'. Examine this statement.	5	4	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I					
11.	a)	State the different approaches to OB.	1	1	3
	b)	How cross-cultural communications affects an organization?	1	1	3
OR					
12.	a)	State the importance of social networking in an organization and also its limitations and advantages.	1	1	3
	b)	Explain the importance of OB in the contemporary global scenario.	1	2	3
MODULE II					
13.	a)	Explain the importance of culture and its influence in an organization.	2	2	3
	b)	Define personality and state the important traits of personality.	2	1	3

OR					
14.	a)	Illustrate how a person's perception influences a group.	2	3	3
	b)	Why it is said that attitude and perceptions of a person are influenced by the culture of an organization?	2	1	3
MODULE III					
15.	a)	How theories of motivation helps the organization?	3	1	3
	b)	In what way the different types of leadership are found in an organization.	3	1	3
OR					
16.	a)	State the various stages of decision-making process.	3	1	3
	b)	Does the role of ethics play a vital part in an organization? Justify your answer.	3	4	3
MODULE IV					
17.	a)	'An efficient and effective team brings a positive result for an organization'. Justify your answer.	4	4	3
	b)	Identify the types of groups found in an organization.	4	1	3
OR					
18.	a)	With proper examples, identify some trans-cultural issues in an organization.	4	1	3
	b)	How different groups in an organization affect inter-personal relationships?	4	1	3
MODULE V					
19.	a)	Assess the types of conflict in an organization.	5	4	3
	b)	Conflicts are natural happenings in an organization. Provide suitable examples to justify your answer.	5	2	3
OR					
20.	a)	Need for change is inevitable for an organization. How will overcome the resistance to change?	5	1	3
	b)	Provide some challenges and opportunities for organizational behaviour in the current scenario.	5	2	3

COURSE DESCRIPTION		
Course Code	21CA204-A	Course Credit: 4
Course Name	Business Intelligence	
L-T-J-P	3-0-0-1	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	Expose to the basic rudiments of business intelligence system.
2	Discuss the modeling aspects of Business Intelligence.
3	Analyze the business intelligence life cycle and the techniques used in it.
4	Represent different data analysis tools and techniques.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Outline the fundamentals of Business Intelligence.	1
CO2	Define data analysis link with Business Intelligence.	1
CO3	Analyze the modeling aspects behind Business Intelligence.	4
CO4	Evaluate the data analysis and knowledge delivery stages	5
CO5	Apply business intelligence methods and tools to various situations.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	2	-	1	-	-	-	-	-	-	-
CO3	3	-	3	-	2	-	-	-	-	-	-	-
CO4	1	-	3	-	-	-	-	-	-	-	-	-
CO5	2	-	2	-	-	-	-	-	-	1	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

EMBEDDED THEORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	36 Hours
Internal Test (2 Internal assessment tests of two-hour duration)	4 Hours

SYLLABUS

Bi and big data from the business part -The Business Intelligence Front End - Catalysts for Success - Organizing for Success - The Future of Business Intelligence

COURSE CONTENT - EMBEDDED THEORY

Module-I		COs	Hrs.	ESE Marks
Module Title	Bi and big data from the business part			
Introduction-Business intelligence by other name - How business levels provides value - The business intelligence market - Battle Scars		1	2	20%
The research- Technobabble: Components of Business Intelligence Architecture: Operational and Source System		1	2	
Data Transfer: From Optional to Data Warehouse - The Data Warehouse - Data Warehouse Tables		1	2	
The Data Warehouse Technology Platform - Big Data Technologies		1	2	
Module-II		COs	Hrs.	ESE Marks
Module Title	Business Intelligence Front End			
Utopia Self Service BI - Business Query and Reporting - Visual Data Discovery		2	2	20%
Dashboards - Scorecards - Production Reporting		2	2	
Mobile BI - OLAP- Performance Management - Analytic Applications		2	1	
Advanced and Predictive Analytics - Big Data Analytics		2	2	
Measures of Success: Success and Business Impact - Measuring Success - Measures of Success at Netflix - Learning Circle - Constant Contact		2	2	
Return on Investment - Anecdotes of Hard Business Benefits - Number of Users - Other Measures of Success		2	2	
Module-III		COs	Hrs.	ESE Marks
Module Title	Catalysts for Success			
The LOFT Effect- The Role of Luck- Opportunity – Frustration – Threat - The Role of Time		3	2	20%
Possibility of Successful BI - Executive Support and Success - Best Sponsor - The role of an Executive Sponsor		3	1	
Getting and Keeping Executive Buy-in- Culture - The Business-IT partnership		3	1	
Better Partnership and BI Success - Partnership at Netflix		3	1	
D for Data - Data Breadth - Data Quality - Successful Data Architectures		3	1	
Master Data Management - Right Time Data		3	1	
Relevance- for Clearer Vision - Patient Care and Teachers - The Role of Incentives - Personalization		3	1	
Requirements Driven BI - Agile Development: Agile Culture at Netflix		3	1	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Organizing for Success			
Enterprise and Departmental BI - The BI Steering Committee - Business Intelligence Competency Centers		4	1	20%
The Best People - BI Team Leaders as Level 5 Leaders		4	1	
The Right BI Tool for the right User- Importance of BI Tools - Role of BI Standardization		4	1	
Characteristics for Defining User Segments - The Most Successful BI Module - Innovation		4	2	
Evangelizing and Promoting BI Capabilities – Training - Best Practices for		4	1	

Successful Business Intelligence				
Module-V		COs	Hrs.	ESE Marks
Module Title	The Future of Business Intelligence			
Improvement and Innovation Priorities - BI Search and Text Analytics		5	1	20%
Collaboration - Email and Microsoft Office Integration		5	1	
Microsoft Power BI: Learn to create stunning Dashboards and Reports using Microsoft's free Business Intelligence / Analytics tool		5	1	
Privacy in the area of Big Data - Evolving your capabilities		5	1	

TEXT BOOKS

1	Cindi Howson, Successful Business Intelligence: Unlock the Value of BI and Big Data, 2 nd Edition, McGraw-Hill Education, 2017, ISBN-13:978-0071809184
2	Errin O'Connor, Microsoft Power BI Dashboards Step by Step, 1 st Edition, Microsoft Press, 2018, ISBN-10 1509308032, ISBN-13:978-1509308033
3	Brian Larson, Data Analysis with Microsoft Power BI, 1 st Edition, McGraw Hill, 2019, ISBN-13: 978-1260458619

REFERENCE BOOKS

1	Efraim Turban, Ramesh Sharda, Dursun Delen, Business Intelligence and Analytics: Systems for Decision Support, 10 th Edition, Pearson, 2015, ISBN-13: 9780133050905
2	Rick Sherman, Business Intelligence Guidebook: From Data Integration to Analytics, 1 st Edition, Morgan Kaufmann, 2014, ISBN-13: 978-0124114616
3	Larissa T. Moss, Shaku Atre, Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications, Addison Wesley Information Technology Series, 2003, ISBN-13: 978-0201784206
4	David Loshin, Business Intelligence: The Savvy Manager's Guide, 2 nd Edition, Morgan Kaufmann, 2012, ISBN-13: 978-0123858894
5	Gert H. N. Laursen, Jesper Thorlund, Business Analytics for Managers: Taking Business Intelligence Beyond Reporting, 2 nd Edition, Wiley, 2016, ISBN-10: 111929858X, ISBN-13: 978-1119298588

EMBEDDED LABORATORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)

Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	12 Hours
Internal Test	1 Hour

COURSE CONTENT - EMBEDDED LABORATORY

List of Laboratory Experiments		COs	Hours
1	Installation and initial set up in Power BI	2	2
2	Create a stunning dashboard in Power BI	2	3
3	Designing visual stunning reports in Power BI	2	3
4	Report Visualizations	5	2
5	Charts	5	2

LABORATORY MANUAL

An internally prepared laboratory manual
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REFERENCE BOOKS

1	Devin Knight, Brian Knight, Mitchell Pearson, Microsoft Power BI Quick Start Guide: Build dashboards and visualizations to make your data come to life, Packt Publishing Limited, 2018, ISBN-10:1789138221, ISBN-13:978-1789138221
2	Brett Powell, Mastering Microsoft Power Bi: Expert techniques for effective data analytics and business intelligence, Ingram short title, 2018, ISBN-10:1788297237, ISBN-13:978-1788297233

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE) (Theory)	20
Internal Test - I	10
Internal Test - II	10
Continuous Internal Evaluation (CIE) (Laboratory)	12
Day to day performance and documentation	08
Test and viva voce	04
Attendance (Theory and Laboratory together)	8
End Semester Examination (ESE) Theory	60
Total	100

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

D	Total Pages:		2
Register No.:		Name:	

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SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA204-A		
Course Name:	Business Intelligence		
Max. Marks:	60	Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	What is Business Intelligence? Why is it important?	1	1	3
2.	Write a short note on the business value of business intelligence.	1	1	3
3.	What is Visual Data Discovery?	2	2	3
4.	Compare advanced analytics and predictive analytics.	2	2	3
5.	What makes Business Intelligence successful?	3	2	3
6.	Write a short note on Requirements driven BI.	3	1	3
7.	Compare the approaches Departmental BI and Enterprise BI.	4	3	3
8.	Comment on the importance of BI tools.	4	2	3
9.	Write a short note on BI search and Text Analytics.	5	3	3
10.	What are the advantages of Microsoft Power BI?	5	1	3

PART B

(Answer one full question from each module- each question carries 6 marks)

MODULE I					
11.	a)	Explain the components of Business Intelligence Architecture.	1	1	4
	b)	What is the role of Data Warehousing in your Business Intelligence Architecture?	1	2	2
OR					
12.	a)	Explain the Data Warehouse Technology Platform in detail.	1	1	4
	b)	Write a short note on Big Data Technologies.	1	2	2
MODULE II					
13.	a)	Comment on Business Intelligence dashboard and scorecard.	2	3	4
	b)	What is mobile BI?	2	2	2
OR					
14.	a)	Write a short note on OLAP.	2	1	2
	b)	Explain the measures of success of business intelligence.	2	2	4

MODULE III					
15.	a)	If there is no LOFT effect- is successful BI still possible? Justify your answer.	3	4	3
	b)	What is the significance of Data Breadth and Data Quality in business?	3	3	3
OR					
16.		Comment on the need of better partnership for BI success with an example.	4	3	6
MODULE IV					
17.	a)	What are the characteristics for defining user segments?	4	2	3
	b)	Write a short note on business intelligence competency centres.	4	1	3
OR					
18.		Explain the best practices for successful Business Intelligence.	4	3	6
MODULE V					
19.		Comment on the improvement and innovation priorities for the future of Business Intelligence.	4	3	6
OR					
20.	a)	Explain the process of creating stunning dashboards in Power BI.	5	4	4
	b)	Analyze the role of privacy in the area of Big Data.	5	3	2

COURSE DESCRIPTION		
Course Code	21CA204-B	Course Credit: 4
Course Name	Programming Essentials for Big Data	
L-T-J-P	3-0-0-1	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To understand the concept of Big data.
2	To learn the specialized aspects of big data including big data application, and big data analytics.
3	To study the programming aspects of big data.
4	To introduce the tools required to manage and analyse big data.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Define the basics of big data platform.	1
CO2	Outline the framework for big data processing.	2
CO3	Identify the tool and dataset for large-scale data processing.	3
CO4	Infer the organization of data in big data processing.	2
CO5	Experiment with tools to handle the data.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	1	-	-	-	-	-	-	-	-	-
CO4	3	-	1	-	-	-	-	-	-	-	-	-
CO5	3	1	2	-	3	-	1	-	-	-	-	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

EMBEDDED THEORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	36 Hours
Internal Test (2 Internal assessment tests of two-hour duration)	4 Hours

SYLLABUS

Big Data Platform - Big Data Processing Frameworks - Understanding Spark and RDDs - DataFrames and Data - Streaming Processing and Messaging using Spark

COURSE CONTENT - EMBEDDED THEORY

Module-I		COs	Hrs.	ESE Marks
Module Title	Big Data Platform			
Types of Big Data - Elements of Big Data – Volume – Velocity – Variety – Veracity - Value		1	3	20%
Big data stack - Big data Analytics - Types of Big Data Analytics		1	3	
Introducing Technologies for handling Big Data: Distributed and Parallel Computing for Big Data - Cloud Computing and Big Data		1	4	
Module-II		COs	Hrs.	ESE Marks
Module Title	Big Data Processing Frameworks			
Hadoop Ecosystem – Features of HDFS - Features of MapReduce - Map Reduce Framework - Working of Map Reduce - Exploring Map and Reduce Functions		2	4	20%
Hadoop Yarn - Apache Hive - Apache Pig - Apache Kafka – Producer – Broker - Consumer		2	3	
Apache Spark - Cluster Managers – PostgreSQL – Hbase – Hive – Sqoop – ZooKeeper – Flume – Oozie		2	3	
Module-III		COs	Hrs.	ESE Marks
Module Title	Understanding Spark and RDDs			
Apache spark - Spark Jobs and APIs – Execution process – Dataframes – Datasets - catalyst optimizer		3	2	20%
Spark 2.0 architecture – Unifying datasets and dataframes		3	2	
Introducing SparkSession		3	2	
Structured streaming - Continuous applications		3	2	
Resilient Distributed Datasets –Internal working of an RDD - Creating RDD - Global versus local scope –Transformations - Actions		3	2	
Module-IV		COs	Hrs.	ESE Marks
Module Title	DataFrames and Data			
Python to RDD communications - Catalyst optimizer refresh - Speeding up Pyspark with Dataframes		4	2	20%
Creating DataFrames - Simple Dataframe queries - Interoperating with RDDs - Querying with the DataFrame API		4	2	
Querying with SQL - Preparing data for modelling - Getting familiar with your data - Visualization		4	2	
Checking for duplicates - Missing observations and outliers		4	2	
Module-V		COs	Hrs.	ESE Marks
Module Title	Streaming Processing and Messaging using Spark			
Introducing Spark streaming		5	2	20%
Spark streaming architecture – DStreams – State operations – Sliding window operations		5	3	
Structured streaming - Structures streaming data sources - Structures streaming		5	3	

data sinks			
Using Spark with messaging platforms – Kafka architecture – Using Spark with Kafka	5	2	

TEXT BOOKS

1	DT Editorial Services, Big Data, Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization, 1 st Edition, Dreamtech Press, 2016, ISBN-10: 9351199312, ISBN-13: 978-8184891430
2	Tomasz Drabas, Denny Lee, Learning PySpark, Packt publishing, Ingram short title ,1 January 2017, ISBN-10: 1786463709, ISBN-13: 978-1786463708
3	Raju Kumar Mishra, PySpark Recipes: A Problem-Solution Approach with PySpark2, 1 st Edition, Apress, 2018, ISBN-10: 9781484231401, ISBN-13: 978-1484231401
4	Aven Jeffrey, Data Analytics with Spark Using Python, 1 st Edition, Pearson Education, 2018, ISBN-10: 9353068452, ISBN-13: 978-9353068455

REFERENCE BOOKS

1	Thomas Erl ,Big Data Fundamentals Concepts, Drivers and Techniques, 1 st Edition , Pearson Education, 2016, ISBN -13: 978-0-13-429107-9 / 9780134291079
2	Jonathan Rioux, Data Analysis with Python and PySpark, Manning Publications, 2019, ISBN-10: 1617297208, ISBN-13: 9781617297205
3	Mittal, M., Balas, V.E., Goyal, L.M., Kumar, R. (Eds.), Big Data Processing Using Spark in Cloud, Singapore 1 st Edition, Springer, 2018, ISBN: 978-981-13-0550-4
4	Viktor Mayer-Schonberger, Big Data, Mariner Books Reprint Edition, 2014, ISBN-10: 0544227751, ISBN-13: 978-0544227750
5	Rudy Lai, Bartłomiej Potaczek, Hands-On Big Data Analytics with PySpark , 1 st Edition, Packt Publishing, 2019, ISBN : 183864413X

EMBEDDED LABORATORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)

Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	12 Hours
Internal Test	1 Hour

COURSE CONTENT - EMBEDDED LABORATORY

List of Laboratory Experiments		COs	Hours
1	Pyspark installation	3	1
2	Create a DataFrame	4	1
3	Create an empty DataFrame	4	1
4	Convert PySpark RDD to DataFrame	4	1
5	Convert PySpark DataFrame to Pandas	4	1
6	Usage of show(), PySpark StructType and StructField	4	1
7	Usage of row class and column class	4	1
8	Usage of select(), collect(), WithColumn(), WithColumnRenamed(), where(), filter(), drop(), dropDuplicates(), orderBy(), sort(), groupBy()	4	1
9	Usage of UDF, map(), pivot(), partitionBy(), ArrayType Column(Array)	4	1
10	Using PySpark SQL functions	4	1
11	Reading CSV file	4	1
12	Writing CSV file	4	1

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	Benjamin Bengfort, Jenny Kim, Interactive Spark using PySpark, O'Reilly Media, Inc., 2016, ISBN: 9781491966181
2	Amit Nandi, The Spark for Python Developers, Packt Publishing Limited, ISBN-10: 1784399698, 2015, ISBN-13 : 978-1784399696

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE) (Theory)	20
Internal Test - I	10
Internal Test - II	10
Continuous Internal Evaluation (CIE) (Laboratory)	12
Day to day performance and documentation	8
Test and viva voce	4
Attendance (Theory and Laboratory together)	8
End Semester Examination (ESE) Theory	60
Total	100

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

D	Total Pages:		2
Register No.:		Name:	

SAINTGITS COLLEGE OF ENGINEERING KOTTAYAM, KERALA

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SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA204-B		
Course Name:	Programming Essentials for Big Data		
Max. Marks:	60	Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	Explain the types of Big data.	1	2	3
2.	List the technologies for handling Big Data	1	1	3
3.	Outline a short note on Hive.	2	2	3
4.	What is the use of Flume?	2	1	3
5.	Define Transformations.	3	1	3
6.	Illustrate actions with an example.	3	2	3
7.	How to create Dataframes?	4	1	3
8.	Analyze the need for visualization.	4	4	3
9.	What is streaming?	5	1	3
10.	What are DStreams?	5	1	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	Explain in details about the elements of Big data while the growth of data is considered.	1	2	6
OR				
12.	Explain Big data analytics with its types.	1	2	6
MODULE II				
13.	Elaborate on the working of Map Reduce.	2	2	6
OR				
14.	Explain the features of HDFS.	2	2	6
MODULE III				
15.	Elaborate on Spark jobs and APIs.	3	2	6
OR				

16.	a)	Explain the internal working of an RDD.	3	2	3
	b)	Outline the steps in creating RDD.	3	2	3
MODULE IV					
17.		What are DataFrames? Explain the advantage of using it in PySpark.	4	1	6
OR					
18.	a)	How to Prepare data for modeling? Explain.	4	2	3
	b)	How to check for duplicates while preparing data for modeling?	4	2	3
MODULE V					
19.		With the help of a diagram, elaborate on Spark Streaming Architecture.	5	2	6
OR					
20.		Elaborate on Sliding windows and windowed RDDs in Spark Streaming.	5	2	6

COURSE DESCRIPTION		
Course Code	21CA204-C	Course Credit: 4
Course Name	Wireless Security and Vulnerability Testing	
L-T-J-P	3-0-0-1	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To familiarize the basic concepts of wireless and mobile network system.
2	To analyse the various categories of attack vectors, vulnerabilities, countermeasures in the area of wireless and mobile networking.
3	To impart state-of-the-art technologies of wireless network security.
4	To perform ethical hacking of wireless systems and networks to expose the potential security lapses in their design and deployment.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Attain the knowledge of wireless networks	2
CO2	Identify advanced security and privacy issues in wireless networks	1
CO3	Comprehend and impart state-of-the-art technologies and protocols of wireless network security.	2
CO4	Apply wireless hacking technologies and RFID technology	3
CO5	Design and develop a secured mobile and wireless network considering all possible security threats.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	1	1	3	-	1	-	1	1	-
CO2	2	2	2	2	2	3	-	2	-	2	2	-
CO3	2	2	2	2	2	3	-	2	-	2	2	-
CO4	2	2	2	2	2	3	-	2	-	2	2	-
CO5	2	3	3	3	3	3	-	2	-	3	2	-
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

EMBEDDED THEORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	36 Hours
Internal Test (2 Internal assessment tests of two-hour duration)	4 Hours

SYLLABUS

Wireless Network Basics - Vulnerabilities of Wireless Networks - Wireless Network Security and Protocols - RFID and Wireless hacking techniques - Penetration Testing and Mobile Security

COURSE CONTENT - EMBEDDED THEORY

Module-I		COs	Hrs.	ESE Marks
Module Title	Wireless Networking Basics			
Wireless LAN - Components of Wireless communications systems - Wireless LAN Architecture - Advantages of Wireless LANs over Wired LAN - Wireless network protocols - Wireless Application Protocol (WAP) - WAP Architecture - Comparison of the TCP/IP-OSI-WAP model - How WAP works		1	7	20%
Module-II		COs	Hrs.	ESE Marks
Module Title	Vulnerabilities of Wireless Networks			
Risks in Wireless Networks: Wireless Reconnaissance - Password Brute Forcing- Man-in-the-Middle Attacks: ARP Spoofing – Piggybacking - Wardriving - Evil Twin Attacks-Wireless Sniffing - Unauthorized Computer Access - Shoulder Surfing - Theft of Mobile Devices		2	7	20%
Module-III		COs	Hrs.	ESE Marks
Module Title	Wireless network Security and Protocols			
Security Services: Confidentiality, Authentication-WEP Authentication – Integrity Encryption: Stream Ciphers vs. Block Ciphers - Non Repudiation - Access Control, Availability. The security status of WAP - WAP Security Architecture - Transport Level security - Application Level security - Secure sessions - Steps to minimize the risks in a wireless network.		3	7	20%
Wireless Security Protocols: WEP – WPA - WPA2 - WPA3 – WEP Security - RC4 Encryption - Cracking WEP		3	7	
Module-IV		COs	Hrs.	ESE Marks
Module Title	RFID and Wireless Hacking Techniques			
An Introduction to RFID - Types of RFID Systems - RFID System components: Tag – Reader – Antennas - Middleware. Attaching RFID Tags - Tracking the movements of Items - Architecture Guide Lines - System Management - RFID Security and Privacy		4	6	20%
Wireless Hacking Techniques - Wireless Attacks - DoS and DDoS attacks		4	4	
Module-V		COs	Hrs.	ESE Marks
Module Title	Penetration Testing and Mobile Security			
Penetration Testing - Penetration Testing Tools		5	3	20%
Mobile Security - Securing Wi-Fi - WiMAX - Bluetooth Security		5	7	

TEXT BOOKS

1	Tyler Wrightson, Wireless Network Security: A Beginner's Guide, McGraw-Hill, 1 st Edition, 2012, ISBN-13: 978-0071760942.
2	Russell Dean Vines, Wireless Security Essentials: Defending Mobile Systems, John Wiley & Sons, 1 st Edition, 2002, ISBN-10: 0471209368, ISBN-13: 978-0471209362.
3	William Stallings, Cryptography and Network Security: Principles and Practice, Pearson, 6 th Edition, 2013, ISBN-10: 0133354695, ISBN-13: 978-0133354690.

REFERENCE BOOKS

1	Matthew Gast, 802.11 Wireless Networks: The Definitive Guide, O'Reilly, 2 nd Edition, 2005, ISBN-10: 0596100523, ISBN-13: 978-0596100520
2	Cyrus Peikari, Seth Fogie, Maximum Wireless Security, SAMS Publishing, 1 st Edition, 2002, ISBN-10: 0672324881, ISBN-13: 978-0672324888
3	Hakima Chaouchi, Wireless and Mobile Network Security, Wiley-ISTE, 1 st Edition, 2009, ISBN-10: 1848211171, ISBN-13: 978-1848211179
4	John R. Vacca, Guide to Wireless Network Security, Springer, 1 st Edition, 2006, ISBN-10: 0387954252, ISBN-13: 978-0387954257
5	Christos Douligeris, Dimitrios N. Serpanos, Network Security: Current Status and Future Directions, Wiley-IEEE Press, 1 st Edition, 2007, ISBN: 978-0-471-70355-6
6	Bill Glover, RFID Essentials, O'Reilly, 1 st Edition, 2006, ISBN-10: 9780596009441, ISBN-13: 978-0596009441
7	Levente Buttyan, Jean-Pierre Hubaux, Security and Cooperation in Wireless Networks, Cambridge University Press, 1 st Edition, 2007, ISBN-10: 0521873711, ISBN-13: 978-0521873710
8	Jim Doherty, Wireless and Mobile Device Security, Jones & Bartlett Learning, 2 nd Edition, 2021, ISBN-10: 128421172X, ISBN-13: 978-1284211726

EMBEDDED LABORATORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)

Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	12 Hours
Internal Test	1 Hour

COURSE CONTENT - EMBEDDED LABORATORY

List of Laboratory Experiments		COs	Hours
1	Install CommView for WiFi and configure it to view network packets, strings and packet types.	1	2
2	Use TCP Traceroute utility to ensure delivery of packet stream between applications and trace packet paths through networks in order to find what's blocking traffic.	2	2
3	With the help of NMap, find which hosts are running in the network, services provided by the host and what operating systems they are running.	3	2
4	Install Wireshark and trace the packets and interpret the data sent from the source to destination.	4	2
5	Using Wireshark, find the various protocols used by the network to send and receive the data.	3	2
6	With the aid of Angry IP Scanner, scan a range of IP addresses to find hosts that are alive and obtain information like, MAC address, open ports, hostname, ping time, NetBIOS information.	2	2

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	Tyler Wrightson, Wireless Network Security: A Beginner's Guide, McGraw-Hill, 1 st Edition, 2012, ISBN-13: 978-0071760942.
2	Russell Dean Vines, Wireless Security Essentials: Defending Mobile Systems, John Wiley & Sons, 1 st Edition, 2002, ISBN-10: 0471209368, ISBN-13: 978-0471209362.

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE) (Theory)	20
Internal Test - I	10
Internal Test - II	10
Continuous Internal Evaluation (CIE) (Laboratory)	12
Day to day performance and documentation	08
Test and viva voce	04
Attendance (Theory and Laboratory together)	8
End Semester Examination (ESE) Theory	60
Total	100

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

D	Total Pages:	2
Register No.:	Name:	

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SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA204-C
Course Name:	Wireless Security & Vulnerability Testing
Max. Marks:	60
Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	List any three advantages of wireless LANs over wired LANs.	1	1	3
2.	Explain the components of wireless LANs.	1	2	3
3.	What is password brute forcing?	2	2	3
4.	Define ARP spoofing.	2	1	3
5.	Explain WEP authentication.	3	2	3
6.	What is RC4 encryption?	3	2	3
7.	What are the different types of frequencies used in RFID?	4	2	3
8.	How RFID tag can be attached?	4	3	3
9.	What is penetration testing?	5	2	3
10.	Define Bluetooth technology.	5	1	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	What is WAP? Explain the architecture of WAP.	1	2	6
OR				
12.	Compare the TCP/IP, OSI and WAP model.	1	4	6
MODULE II				
13.	Describe the following a) Piggybacking b) Wardriving c) Wireless Sniffing	2	2	6
OR				
14.	Explain the risks in a wireless network.	2	2	6
MODULE III				
15.	Illustrate the security services available in a wireless network.	3	2	6

OR					
16.	a)	Distinguish between stream ciphers and block ciphers.	3	3	2
	b)	Differentiate WEP and WPA security protocols.	3	3	4
MODULE IV					
17.	Explain the RFID system components.		4	2	6
OR					
18.	What is hacking? Explain the various wireless hacking techniques.		4	2	6
MODULE V					
19.	Describe the penetration testing tools available in wireless security.		5	2	6
OR					
20.	How can be secure a Wi-Fi and WiMAX technology?		3	2	6

COURSE DESCRIPTION		
Course Code	21CA204-D	Course Credit: 4
Course Name	Concepts and Applications of Internet of Things	
L-T-J-P	3-0-0-1	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	Get introduced to general concepts of Internet of Things and IoT Protocols.
2	To have awareness of what is Cloud, its importance, usage, services and types of Cloud.
3	To identify various devices, sensors and have understanding of IoT architecture.
4	To create IoT solutions using Sensors, Actuators and Devices.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Have awareness of Internet of Things, design of IoT and IoT Protocols.	2
CO2	Share knowledge about IoT resources in the Cloud and what is Fog Computing.	2
CO3	Analyse IoT architecture.	4
CO4	Have knowledge of IoT Privacy and Security.	2
CO5	Programme with ThingSpeak and design various applications of IoT.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	1	1	3	-	-	-	-	-	-
CO2	3	2	1	2	2	1	3	-	-	-	-	2
CO3	2	3	1	-	2	-	2	-	-	3	-	1
CO4	3	3	2	-	2	-	-	-	-	1	1	-
CO5	2	3	1	2	3	3	2	-	2	-	1	2
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

EMBEDDED THEORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	36 Hours
Internal Test (2 Internal assessment tests of two-hour duration)	4 Hours

SYLLABUS

Introduction to Internet of Things - IoT Protocols - IoT resources in the Cloud - Fog Computing in IoT environment-IoT Architecture - Smart Objects - IoT privacy and security - Applied IoT- Programming frameworks for Internet of Things:Thing Speak

COURSE CONTENT - EMBEDDED THEORY

Module-I		COs	Hrs.	ESE Marks
Module Title	Introduction and IoT Protocols			
Introduction to Internet of Things: Definition and Characteristics of IoT – Sensors-Actuator - Physical Design of IoT IoT Protocols - IoT communication models-IoT Communication APIs. - Overview of Governance - Privacy and Security Issues		1	6	20%
Module-II		COs	Hrs.	ESE Marks
Module Title	IoT resources in the Cloud and Fog Computing in IoT environment			
IoT resources in the Cloud: Device/Cloud collaboration framework for intelligence applications - Virtual machines - Virtualization technology		2	4	20%
Introduction to Fog Computing: Principles - Fog Computing in IoT environment - Fog architectures and applications		2	3	
Module-III		COs	Hrs.	ESE Marks
Module Title	IoT Architecture and Smart Objects			
IoT Architecture: IoT Open source architecture (OIC) - OIC Architecture & Design principles - IoT Devices and deployment models - Introduction of Arduino and RaspberryPi		3	4	20%
Smart Objects: The “Things” in IoT – Sensors - Actuators and Smart Objects - Sensor Networks - Connecting Smart Objects - Communications Criteria - IoT Access Technologies		3	4	
Module-IV		COs	Hrs.	ESE Marks
Module Title	IoT Privacy and Security			
IoT Privacy and Security: Introduction – Vulnerabilities - Security requirements and threat analysis - IoT Security - Tomography and layered attacker model		4	5	20%
Module-V		COs	Hrs.	ESE Marks
Module Title	Applied IoT and ThingSpeak			
Applied Internet of Things: Internet of Vehicles and applications - Cloud-Based Smart - Facilities Management.- IoT case studies on Industrial Automation, Transportation, Agriculture, Healthcare and Home Automation		5	5	20%
Programming frameworks for Internet of Things: ThingSpeak		5	5	

TEXT BOOKS

1	Honbo Zhou, The Internet of Things in the Cloud: A Middleware Perspective, 1 st Edition, CRC Press; 2012, ISBN: 978-1439892992
2	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds.), Architecting the Internet of Things, Springer, 2011, ISBN: 9783642191572, 3642191576
3	Rajkumar Buyaa and Amir V Dastjerdi, Internet of Things: Principles and Paradigms, Morgan Kaufmann, 2016, ISBN-10: 012805395X, ISBN-13: 978-0128053959

REFERENCE BOOKS

1	Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things – Key applications and Protocols, 1 st Edition, Wiley, 2012, ISBN: 1119994357
2	Peter Waher, Learning Internet of Things, Packt Publishing, 2015, ISBN-10: 1783553537, ISBN-13: 978-1783553532
3	S. Sitharama Iyengar; Nandan Parameshwaran, Vir V. Phoha; N. Balakrishnan and Chuka D. Okoye, Fundamentals of Sensor Network Programming: Applications and Technology, Wiley, 2010, ISBN:978-0-470-87614-5
4	Robert Stackowiak, Art Licht, VenuMantha and Louis Nagode, Big Data and The Internet of Things: Enterprise Information Architecture for A New Age, Apress, 2015, ISBN: 978-1-4842-0986-8
5	A Bahga & V Madiseti, Internet of Things: A Hands On Approach, Orient Blackswan Private Limited, 2015, ISBN: 978-8173719547

EMBEDDED LABORATORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)

Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	12 Hours
Internal Test	1 Hour

COURSE CONTENT - EMBEDDED LABORATORY

List of Laboratory Experiments		COs	Hours
1	Familiarization with Arduino/Raspberry Pi and perform necessary software installation	3	3
2	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth	3	3
3	To familiarize with ThingSpeak and understand the procedure of creation of a Channel over ThingSpeak	2,5	2
4	Write a program on Arduino/Raspberry Pi to upload temperature and humidity sensor data to ThingSpeak cloud	2,5	2
5	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity sensor data from ThingSpeak cloud	2,5	2

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	Maneesh Rao, Internet of Things with Raspberry Pi 3, Packt Publications, 2018, ISBN: 9781788627405
2	https://thingspeak.com (Web Reference)

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE) (Theory)	20
Internal Test - I	10
Internal Test - II	10
Continuous Internal Evaluation (CIE) (Laboratory)	12
Day to day performance and documentation	08
Test and viva voce	04
Attendance (Theory and Laboratory together)	8
End Semester Examination (ESE) Theory	60
Total	100
<p>There will be two parts; Part A and Part B. Part A: 30 marks Part B: 30 marks Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.</p>	

D	Total Pages:	2
Register No.:	Name:	

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SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR

Course Code:	21CA204-D		
Course Name:	Concepts and Applications of Internet of Things		
Max. Marks:	60	Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	Discuss the Characteristics of Internet of Things.	1	2	3
2.	Write brief note on Communication APIs.	1	2	3
3.	Examine the need of Cloud collaboration framework for intelligence applications.	2	4	3
4.	Does fog computing support IoT concepts? Present your views.	2	4	3
5.	Write notes on any two IoT Devices.	3	2	3
6.	Discuss the term "Smart Objects" in relation with IoT.	3	2	3
7.	Examine the need of Tomography in IoT Security.	4	4	3
8.	What are major Vulnerabilities of IoT systems? Examine various security requirements.	4	2	3
9.	"IoT influence the development of smart cities". Present your views on the statement.	5	4	3
10.	What impact does the IoT have on vehicles? Present a tutorial.	5	4	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	Explain various trend in Information and communication technologies and its impact on IoT.	1	3	6
OR				
12.	Discuss i) IoT Communication Models ii) IoT Protocols	1	2	6
MODULE II				
13.	Explain how cloud of things acts as an enabler for new value added services and applications with a neat diagram.	2	3	6
OR				

14.	Write notes on i) Virtualization ii) Fog Computing Applications in IoT	2	2	6
MODULE III				
15.	Explain in detail IoT Access Technologies.	3	2	6
OR				
16.	a) Discuss how the design objectives of IoT architecture target a horizontal system of real-world services.	3	2	2
	b) With a neat figure, present IoT Open source architecture.	3	3	4
MODULE IV				
17.	Discuss the various Security models in IoT.	4	3	6
OR				
18.	What is Threat Analysis in IoT. Elaborate your views.	4	4	6
MODULE V				
19.	Explain the various emerging IoT applications.	5	3	6
OR				
20.	Present a tutorial on Thingspeak on cloud.	5	3	6

COURSE DESCRIPTION		
Course Code	21CA204-E	Course Credit: 4
Course Name	Ethical Hacking and Cyber Forensics	
L-T-J-P	3-0-0-1	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To explore ethical hacking basics.
2	To explore various hacking techniques.
3	To realize concepts, developments, challenges in cyber forensics.
4	An in-depth study of each phases involved in a forensics investigation processes.
5	Students will get the exposure to various hacking and forensic tools.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Describe basic concepts of ethical hacking and Identify footprinting techniques and tools.	2
CO2	Demonstrate the ability to attack and defend a network.	3
CO3	Know the role of digital forensics profession and importance of digital forensics.	2
CO4	Gain Knowledge on data acquisition and digital evidence storage.	2
CO5	Get the practical exposure to different forensic tools.	2

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3	1	1	-	-	-	-	-	-	-
CO2	1	2	3	3	1	1	-	-	-	2	-	1
CO3	2	1	2	1	1	-	-	-	-	-	-	-
CO4	1	2	3	1	-	-	1	-	-	1	-	-
CO5	3	2	3	3	-	1	-	-	-	-	-	2
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

EMBEDDED THEORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	36 Hours
Internal Test (2 Internal assessment tests of two-hour duration)	4 Hours

SYLLABUS

Ethical Hacking overview – Embedded Operating Systems – Understanding the Digital Forensics Profession and Investigations – Data Acquisition – Current Digital Forensics Tools

COURSE CONTENT - EMBEDDED THEORY

Module-I		COs	Hrs.	ESE Marks
Module Title	Ethical Hacking overview			
Ethical Hacking overview – Network and computer attacks		1	2	20%
Footprinting and social Engineering – Port Scanning – Enumeration		1	3	
Programming for Security Professionals – Desktop and server OS vulnerabilities		1	2	
Module-II		COs	Hrs.	ESE Marks
Module Title	Embedded Operating Systems			
Embedded Operating Systems: The Hidden Threat		2	2	20%
Hacking Web Servers – Hacking Wireless Networks		2	3	
Network Protection Systems – Virtualization and Ethical Hacking		2	2	
Module-III		COs	Hrs.	ESE Marks
Module Title	Understanding the Digital Forensics Profession and Investigations			
Introduction to Digital Forensics – History of Digital forensics		3	2	20%
Understanding Case Law – Developing Digital Forensics Resources – Preparing a Digital Forensics Investigations		3	2	
Understanding Law Enforcement Agency Investigations		3	1	
Understanding Private - Sector Investigations – Maintaining professional conduct		3	2	
Module-IV		COs	Hrs.	ESE Marks
Module Title	Data Acquisition			
Data Acquisition – Understanding Storage Formats for Digital Evidence		4	2	20%
Determining the Best Acquisition Method – Contingency Planning for Image Acquisitions – Using Acquisition Tools		4	3	
Validating Data Acquisitions		4	1	
Module-V		COs	Hrs.	ESE Marks
Module Title	Current Digital Forensics Tools			
Evaluating Digital Forensics Tool Needs: Types of Digital Forensics Tools – Tasks Performed by Digital Forensics Tools – Tool Comparisons – Other Considerations for Tools		5	3	20%
Digital Forensics Software Tools: Command - Line Forensics Tools – Linux Forensics Tools – Other GUI Forensics Tools – Wireshark- Network Miner - NMAP- OSForensics		5	2	
Digital Forensics Hardware Tools: Forensic Workstations – Using a Write-Blocker- Recommendations for a Forensic Workstation		5	2	
Validating and Testing Forensics Software: Using National Institute of Standards and Technology Tools – Using Validation Protocols		5	2	

TEXT BOOKS

1	Michael T Simpson, Kent Backman, James Corley, Hands on ethical hacking and network defense, 2 nd Edition, Cengage Learning, 2010, ISBN: 978-1-4354-8609-6
2	Bill Nelson, Amelia Phillips, Frank Enfinger, Christofer Steuart, Guide to Computer Forensics and Investigations: Processing Digital Evidence, 6 th Edition, Cengage Learning, 2019, ISBN: 978-1-337-56894-4
3	Eoghan Casey, Digital Evidence and Computer Crime, 3 rd Edition, Academic Press, 2011, ISBN: 978-0123742681

REFERENCE BOOKS

1	Ed Skoudis and Tom Liston, Counter Hack Reloaded, A step-by-step guide to computer attacks and effective defences, 2 nd Edition, Prentice Hall Series in Computer Networking and security, 2006, ISBN-13:9780131481046, ISBN-10: 0131481045
2	Kimberly Graves, Certified Ethical Hacker : A Study Guide, 2 nd Edition, Wiley Publishing, 2010, ISBN: 9780470525203
3	Eoghan Casey, Digital Evidence and Computer Crime, 3 rd Edition, Academic Press, 2011, ISBN:978-0-12-374268-1
4	Marjie Britz, Computer Forensics and Cyber Crime: An Introduction, 2 nd Edition, Prentice Hall, 2008, ISBN-13: 978-0132447492
5	David Benton and Frank Grindstaff, Practical guide to Computer Forensics, 1 st Edition, Book Surge Publishing, 2006, ISBN-13: 978-1419623875

EMBEDDED LABORATORY

COURSE IMPLEMENTATION CLOCK (IN HOURS)

Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	12 Hours
Internal Test	1 Hour

COURSE CONTENT - EMBEDDED LABORATORY

	List of Laboratory Experiments	COs	Hours
1	Study of Computer Forensics tools used for forensic investigation - The Sleuthkit Kit (TSK), Helix and Knoppix	1	1
2	To study about "Footprinting and Reconnaissance": Finding IP Address - Domain Name Information - Finding IP Address - Finding Hosting Company - IP Address Ranges - History of the Website	1	1
3	To study about Fingerprinting - Port Scanning - Ping Sweep	1	1
4	To study about System Hacking- TCP/IP Hijacking using Shijack and Hunt	2	1
5	To study about Wireless Hacking – Kismet - NetStumbler	2	1
6	To learn & study about Sniffing & their tools - Wireshark	2	1
7	Study of Computer Forensics tools used for forensic investigation - Autopsy- Wireshark - Network Miner - NMAP- OSForensics	5	1
8	How to Recover Deleted Files using Forensics Tool - FTK	5	1
9	Hide and extract any text file behind an image file/ Audio file using Command Prompt	5	1
10	How to collect email evidence in victim PC using Dumpit tool	5	1

11	Viewing Last Activity of Your PC	5	1
12	Comparison of two Files for forensics investigation by Compare IT software	5	1

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	James Corley, Kent Backman, Michael Simpson, Hands-On Ethical Hacking and Network Defense, 3 rd Edition, Delmar Cengage Learning, 2016, ISBN: 978-1285454610
2	Darren Hayes, Practical Guide to Digital Forensics Investigations, A (Pearson It Cybersecurity Curriculum (Itcc)), 2 nd Edition, 2020, ISBN: 0789759918

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE) (Theory)	20
Internal Test - I	10
Internal Test - II	10
Continuous Internal Evaluation (CIE) (Laboratory)	12
Day to day performance and documentation	08
Test and viva voce	04
Attendance (Theory and Laboratory together)	8
End Semester Examination (ESE) Theory	60
Total	100

There will be two parts; Part A and Part B.

Part A: 30 marks

Part B: 30 marks

Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 6 marks.

D	Total Pages:	2
Register No.:	Name:	

SAINTGITS COLLEGE OF ENGINEERING KOTTAYAM, KERALA

(AN AUTONOMOUS COLLEGE AFFILIATED TO
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)



SECOND SEMESTER MCA DEGREE EXAMINATION, MONTH AND YEAR



Course Code:	21CA204-E		
Course Name:	Ethical Hacking and Cyber Forensics		
Max. Marks:	60	Duration:	3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

	Question	CO	BTL	MARKS
1.	Explain the concepts of Ethical Hacking.	1	2	3
2.	What is Reconnaissance?	1	1	3
3.	Describe Firewall technology.	2	2	3
4.	Give a brief note on honeypots.	2	3	3
5.	Define digital forensics.	3	2	3
6.	What is professional conduct, and why is it important?	3	1	3
7.	List digital evidence storage formats and explain each.	4	1	3
8.	Describe various RAID acquisition methods.	4	2	3
9.	Explain Command-Line Forensics Tools.	5	2	3
10.	Define Forcepoint Threat Protection.	5	2	3

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I				
11.	How Ethical Hacking be done in the network hosts? Explain with various methods.	1	2	6
OR				
12.	Describe port scanning and explain the methods to defend port scanning.	1	2	6
MODULE II				
13.	List and explain different embedded operating systems.	2	1	6
OR				
14.	a) Explain how routers are used to protect networks.	2	2	3
	b) Describe the tools used to attack web servers.	2	2	3
MODULE III				
15.	List and explain two types of digital investigations typically conducted in a business environment.	3	1	6

OR				
16.	List and explain two types of digital investigations typically conducted in a business environment.	3	1	6
MODULE IV				
17.	Explain different ways to determine the best acquisition method for collecting evidence.	4	2	6
OR				
18.	Explain how to use remote network acquisition tools.	4	2	6
MODULE V				
19.	Which are the types of Digital Forensics tools? Explain each.	5	3	6
OR				
20.	Describe the various methods for validating and testing forensics tools.	5	2	6

COURSE DESCRIPTION		
Course Code	21CA206	Course Credit: 2
Course Name	Advanced Java Programming Lab	
L-T-J-P	0-1-3-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To introduce the advanced java programming concepts and practical exposure.
2	To learn the concepts of JDBC to establish connection with application.
3	To build web application using Java Servlet API and Java Server Pages.
4	To attain the knowledge of spring framework to create, debug and run multi-tier and enterprise-level applications.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Apply the J2EE architecture and Java Collection framework in software development	3
CO2	Develop JDBC based Java programs to perform database CRUD operations.	3
CO3	Design and implement complex and sophisticated Java servlet applications.	3
CO4	Create and execute web applications using Java Server Pages technology.	3
CO5	Construct multi-tier and enterprise-level applications using Spring MVC.	4

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	1	-	-	2	-	-	1	-
CO2	3	3	3	-	2	-	-	3	-	-	2	-
CO3	3	3	3	-	2	-	-	3	-	-	2	-
CO4	3	3	3	-	2	-	-	3	-	-	2	-
CO5	3	3	3	-	2	-	-	3	-	-	2	-

Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"

TUTORIAL

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	12 Hours

SYLLABUS

J2EE Architecture - Collections - Java beans – JDBC-Servlet - JSP- Spring - Spring Boot.

COURSE CONTENT – TUTORIAL

List of Tutorials		COs	Hours
1	J2EE Architecture-Collections - Iterable and Functional Interface - Lambda Expressions - Java beans	1	1
2	JDBC- Architecture - JDBC Drivers - JDBC API – JDBC - ODBC bridge driver	2	1
3	JDBC implementation - Connection class - JDBC Statements – ResultSet - Creating CRUD Application.	2	1
4	Servlet -Servlet Lifecycle – Servlet API - Servlet Interface	3	1
5	Generic Servlet - HTTP Servlet - Handling HTTP Request and Response	3	1
6	Session Tracking - Using Cookies - Http Session	3	1
7	JSP- JSP Life Cycle - JSP Implicit Objects and Explicit Objects	4	1
8	JSP Directives - JSP Scripting Elements – Scriptlets – Expressions - Declarations	4	1
9	Developing a JSP Application - Session Management - Exception Handling - Database integration.	4	1
10	Spring - Spring Architecture –Lifecycle - Dependency Injection and IoC - Aspect Oriented Programming	5	1
11	Data Access Framework - Transaction Management Framework – REST - Create Spring MVC Applications - Spring Boot.	5	1
12	REST Web Services with Spring Boot - Data Access with Spring Boot.	5	1

TEXT BOOKS

1	Herbert Schildt , Java The Complete Reference, McGraw Hill Education (India) Private Limited, 11 th Edition, 2020, ISBN-10: 9390491622, ISBN-13: 978-9390491629
2	Harvey M. Deitel, Paul J. Deitel, Sean E. Santry, Advanced Java™ 2 Platform How to Program, Prentice Hal, Pap/Cdr, 1 st Edition, 2002, ISBN-10: 0130895601, ISBN-13: 978-0130895608
3	Craig Walls, Spring in Action, Manning Publications, 4 th Edition, 2014, ISBN-10: 161729120X

REFERENCE BOOKS

1	Santosh Kumar K, JDBC 4.2, Servlet 3.1, and JSP 2.3 Includes JSF 2.2 and Design Patterns Black Book, Dreamtech Press, 2 nd Edition Paperback, 2016, ISBN-10: 9351199088, ISBN-13: 978-9351199083
2	Uttam Roy, Advanced Java Programming, Oxford University Press, UK Edition, 2015, ISBN-10: 0199455503, ISBN-13: 978-0199455508
3	Joel Murach, Murachs Java Servlets & JSP, Mike Murach & Associates Inc., 3 rd Edition, 2014, ISBN-10: 1890774782, ISBN-13: 978-1890774783
4	Dreamtech Press, Core and Advanced Java Black Book, Dreamtech Press, Kindle Edition, 2018, ISBN-13: 978-9386052216
5	Subrahmanyam Allamaraju, Cedric Beust, Marc Wilcox, Sameer Tyagi, Rod Johnson, Gary Watson, Alan Williamson, John Davies, Ramesh Nagappan, Andy Longshaw, P. G. Sarang, Tyler Jewell, Alex Toussaint, Professional Java Server Programming J2EE, Apress, 1 st Edition, 2001, ISBN-10: 1861005377, ISBN-13: 978-1861005373

PROJECT

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	36 Hours
Internal Test	2 Hours

COURSE CONTENT - PROJECT			
List of Experiments		COs	Hours
1	Develop a simple JDBC application to do the following operations in the employee table. <ul style="list-style-type: none"> Add a new record Retrieve details 	2	2
2	Create a table student with data: rollno, name, total_marks and grade. Write an application to update a record and display the details.	2	2
3	Create a servlet application to check a person is eligible for voting or not.	3	2
4	Create a servlet application to add a new book details to the Library table.	3	2
5	Develop a servlet application to print payslip of an employee.	3	2
6	Implement a servlet program to store a cookie in a client machine and retrieve the stored cookie details and display it.	3	2
7	Create a table to store product information. Develop a JSP application to search, add and delete product details.	4	2
8	Create a JSP application to handle sessions.	4	2
9	Implement a JSP application to check the user credentials .If the login is successful then display a page with welcome message otherwise display the login page.	4	2
10	Create a Spring MVC application to display a message.	5	2
11	Create a Spring MVC application to find the grade of a student.	5	3
12	Create a Spring MVC application to retrieve details from a table	5	3
13	Micro project not limited to <ul style="list-style-type: none"> a) Online Quiz Application b) Feedback Analysis and Management System c) Library Management System d) Healthcare Hospital System e) Educational Products Suppliers System f) Event Management System g) Student Result Processing System h) Car Pooling System i) Students Information System j) Placement Information System k) Online Student Mentoring System l) Online Bouquet Store 	5	10

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	Herbert Schildt, Java The Complete Reference, McGraw Hill Education (India) Private Limited, 11 th Edition, 2020, ISBN-10: 9390491622, ISBN-13: 978-9390491629
2	Harvey M. Deitel, Paul J. Deitel, Sean E. Santry, Advanced Java™ 2 Platform How to Program, Prentice Hal, Pap/Cdr 1 st Edition, 2002, ISBN-10: 0130895601, ISBN-13: 978-0130895608

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE) (Project)	16
Review– I	08
Review– II	08
Continuous Internal Evaluation (CIE) (Laboratory)	16
Day to day performance and documentation	08
Test and viva voce	08
Attendance (CIE Project and CIE Laboratory)	08
End Semester Examination (ESE)	60
Program logic and code	20
Output	10
Viva	10
Project presentation	20
Total	100

COURSE DESCRIPTION		
Course Code	21CA207	Course Credit: 2
Course Name	Advanced Database Management Systems Lab	
L-T-J-P	0-0-0-4	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	To provide hands on exposure to creating databases.
2	To develop logic and basic programming skills using SQL language to join tables and provide the best possible results.
3	To demonstrate the use of PL/SQL operations.
4	To demonstrate the configuration of NoSQL databases.
5	Understand the CRUD operations in NoSQL databases.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Explain basic database concepts, applications, data models, schemas and instances	1
CO2	Apply SQL and PL/SQL for processing databases.	3
CO3	Comparison between relational and non-relational (NoSQL) databases and the configuration of NoSQL Databases.	2
CO4	Apply CRUD operations and retrieve data in a NoSQL environment.	3
CO5	Demonstrate deployment of NoSQL databases with real time requirements.	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	-	-	-	-	1	1	-
CO2	2	2	2	-	1	-	-	-	-	-	-	-
CO3	2	2	2	2	-	-	-	-	-	1	1	-
CO4	2	2	3	1	2	-	1	-	-	1	1	1
CO5	2	2	3	1	1	-	-	1	-	1	1	2
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- “-”												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test	3 Hours

COURSE CONTENT

List of Laboratory Experiments		COs	Hours
1	An overview of relational database design using MySQL/ MariaDB/ PostgreSQL etc. (Apply the following basic queries on an Employee/ Student database etc.) a. DDL Commands b. DML Commands c. Imposing restrictions on database (DCL & TCL Commands) d. Accessing database (SELECT, Filtering using WHERE, HAVING, GROUP BY, ORDER BY Clauses, Subquery and View) e. Optimizing databases (Join, Aggregate & Set operations, Other operators like arithmetic, logical, special etc.)	1	6
2	PL/SQL Programs (Trigger, Cursor, Stored Procedures and Functions)	2	4
3	Introduction to NoSQL Databases. a. Installation and configuration of any one of the NoSQL databases - MongoDB/ Cassandra/ HBase/ CouchDB/ Amazon DynamoDB/ Redis/ Neo4j etc.	3	2
4	Designing Databases using NoSQL	5	2
5	Query Processing a. Performing CRUD operations b. Retrieving Data from a NoSQL database c. Usage of aggregate functions, regular expressions etc.	4	8
6	NoSQL Administration a. Security, Monitoring & Backup b. Create Users and Roles	3	2
7	Local Deployment i. NoSQL and Front-End: PHP/Java/Python (MongoDB/ Cassandra etc.) b. Cloud Deployment i. NoSQL and Cloud: Amazon DynamoDB/ Google Bigtable/ Azure Cosmos DB ii. Familiarization of Atlas/ DataStax corresponding to the selected NoSQL Database	5	15
8	Micro project: Students can be given a group micro project, so that they learn to work in a team environment.	5	9

LABORATORY MANUAL

An internally prepared laboratory manual.

REFERENCE BOOKS

1	Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw Hill Education, 6 th Edition, 2011, ISBN: 978-0-07-352332-3.
2	Guy Harrison, Next Generation Databases: NoSQL, NewSQL, and Big Data, Apress, 1 st Edition 14 December 2015, ISBN-13: 978-1-4842-1330-8.

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Day to day performance and documentation	16
Test and viva voce	16
Attendance	08
End Semester Examination (ESE)	60
Program logic and code	30
Output	20
Viva	10
Total	100

COURSE DESCRIPTION		
Course Code	21CA208	Course Credit: 2
Course Name	Networking and Cyber Security Lab	
L-T-J-P	0-0-0-4	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	Understand the network security threats.
2	Study precautionary measures to protect the devices from unauthorized access, modification, or destruction.
3	Enable the safe operation of an organization's IT systems.
4	Protect the data of an organization and its uses.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Learn the technical duties performed by an InfoSec professional.	2
CO2	Develop the concept of security needed in communication of data through computers and networks along with various possible attacks	4
CO3	Learn about firewalls and establishing firewall security.	3
CO4	Identify the security issues in the network and resolve it.	4
CO5	Analyse the vulnerabilities in any computing system and hence be able to design a security solution.	4

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	1	3	3	-	-	3	-	-
CO2	2	2	1	-	2	3	1	-	-	-	-	-
CO3	3	1	1	-	3	2	-	-	-	-	-	1
CO4	1	3	1	-	-	-	1	1	-	-	-	-
CO5	3	1	1	-	-	1	-	-	-	1	-	1
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	48 Hours
Internal Test	3 Hours

COURSE CONTENT

List of Laboratory Experiments		COs	Hours
1	Study of different types of vulnerabilities for hacking a website /web application.	1	4
2	Analysis the security vulnerabilities of E-commerce services.	1	4
3	Analysis the security vulnerabilities of E-Mail applications	2	4
4	Steps to ensure security of any one web browser (Mozilla Firefox/Google Chrome)	2	4
5	Study of the features of firewall in providing network security and establish firewall security in windows.	3	4
6	Use the windows command-line tools nslookup, ping, and traceroute to perform simple network data retrieval.	3	4
7	Use the windows command-line tool net and nbstat to perform simple network attachment tricks.	4	4
8	use the free Advanced Port Scanner for Windows and THC-Amap applications, respectively, to do simple port scanning	4	4
9	Use a tool called Microsoft Baseline Security Analyzer (MBSA) or Nessus for finding systems vulnerabilities.	5	4
10	Penetration testing with Metasploit.	5	4
11	Web browser security and configuration for Firefox	5	4
12	Use the native Windows firewall tool and IP tables to manage the flow of traffic to and from a Windows	5	4

LABORATORY MANUAL

An internally prepared laboratory manual

REFERENCE BOOKS

1	M Whitman, H Mattord, A Green, Hands-on information security Lab Manual, Cengage, 2014, 4 th Edition, ISBN: 9781285167572
2	M Whitman Mattord, Management of Information Security, Thomson Course Technology, 2008, 4 th Edition, ISBN: 9781423901303

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	40
Day to day performance and documentation	16
Test and viva voce	16
Attendance	08
End Semester Examination (ESE)	60
Program logic and code	30
Output	20
Viva	10
Total	100

COURSE DESCRIPTION		
Course Code	21CA209	Course Credit: P/F
Course Name	Industrial Readiness Training	
L-T-J-P	0-1-0-0	
Year of Introduction	2021	

COURSE OBJECTIVES	
1	Enable students to be ready for the industry environment through focused training sessions in basic quantitative aptitude problem solving and interview skills.

COURSE OUTCOMES (COs)		REVISED BLOOM'S TAXONOMY LEVEL
At the end of the course students will be able to:		
CO1	Students become capable in quantitative analysis problem solving	5
CO2	Students showcase better interview skills in both technical and HR aspects	4
CO3	Achieve better placement opportunities based on the acquired skills	3

CO-PO MAPPING												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	2	1	-	-	-	1
CO2	-	-	-	-	-	-	1	1	-	-	-	1
CO3	-	-	-	-	-	-	1	1	-	-	-	1
Correlation levels: 1- Low; 2-Medium; 3-High; No Correlation- "-"												

COURSE IMPLEMENTATION CLOCK (IN HOURS)	
Course introduction with thorough briefing of Course Objectives and expected Course Outcomes	1 Hour
Course content delivery hours	20 Hours
Internal Test	2 Hours

SYLLABUS

Quantitative Aptitude – English for Competitive Examinations – Mock Interviews

COURSE CONTENT

Module - I	COs	Hrs.
Introduction – Averages – Percentages - Ratio and Proportion Partnerships - Profit	1	10
Module - II	COs	Hrs.
Reading Comprehension – Grammar - Exercises - Synonyms and Antonyms - Verbal	2	5
Module - III	COs	Hrs.
Mock interviews- HR and Technical	3	5

TEXT BOOKS

1	R S Aggarwal, Quantitative Aptitude for Competitive Examinations, S Chand Publishing, Year: February 2017, ISBN: 9352534026
2	R S Aggarwal, A Modern Approach to Logical Reasoning, S Chand Publishing, Year: January 2018, ISBN: 8121919053
3	Rupa, The Quick and Easy Way to Effective Speaking, Publisher: Springer International Publishing, Year: May 2016, ISBN: 8129140209

MODES OF EVALUATION	SCORE WEIGHTAGE / SPLIT MARKS
Continuous Internal Evaluation (CIE)	20
Internal Test	08
Assignment/Report	08
Attendance	04
End Semester Examination (ESE)	30
Objective type examination	30
Total	50