Shri Vile Parle Kelavani Mandal's

MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBEN JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)

NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),

Granted under RUSA, FIST-DST & -Star College Scheme of DBT,

Government of Indi Best College (2016-17), University of Mumbai

Affiliated to the

UNIVERSITY OF MUMBAI

Program:Bachelor of Science (Computer Science)

Third Year:- Semester V & VI

Choice Based Credit System (CBCS) with effect from the Academic year 2023-24

A.C. No: 14th

Agenda No: xiv. a

Ashish Gavande

Neelam Jain

Dr. Amol Joglekar

Tajshree Ravi

Zahiabbas J. Mulani

PROGRAMME OUTCOMES (PO'S)

On completion of the Bachelor of Science the learners should be able to:

PO 1: Develop scientific temper and acquire academic competence in the discipline of choice for the desired professional specialization field as a career.
PO 2: Develop critical understanding of the concepts and effectively relate them at the local, regional and global levels.
PO 3: Explore and analyze the emerging trends in the discipline of choice and associated disciplines
PO 4: Acquire technological and analytical skills needed for industrial support services.
PO 5: Acquire skills like collaboration, communication, entrepreneurship, and independent lifelong learning to overcome challenges ahead.
PO 6: Create awareness on the impact of environment on societal needs & sustainable development and innovate ecofriendly alternatives.

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc. Computer Science, the learners should be enriched with knowledge and be able to-

PS01: To train the students for software development using different programming languages.
PS02: To develop the skills for problem solving in computing and other relevant disciplines.
PS03: To introduce emerging trends to the students in a gradual way.
PS04: To groom the students for facing the challenges in ICT industry.

Preamble

Information and Communication Technology (ICT) has today become integral part of all industry domains as well as fields of academics and research. The industry requirements and technologies have been steadily and rapidly advancing. Organizations are increasingly opting for open source systems. The students too these days are thinking beyond career in the industry and aiming for research opportunities.

The B.Sc. Computer Science course structure therefore needed a fresh outlook and complete overhaul. A real genuine attempt has been made while designing the new syllabus for this three year graduate course. Not only does it prepare the students for a career in Software industry, it also motivates them towards further studies and research opportunities. In the first year i.e. for semester I & II, basic foundation of important skills required for software development is laid. The syllabus proposes to have four core subjects of Computer science and two core courses of Mathematics-Statistics. All core subjects are proposed to have theory as well as practical tracks. While the Computer Science courses will form fundamental skills for solving computational problems, the Mathematics & Statistics course will inculcate research oriented acumen. The syllabus design for further semesters encompasses more advanced and specialized courses of Computer Science. We sincerely believe that any student taking this course will get very strong foundation and exposure to basics, advanced and emerging trends of the subject. We hope that the students' community and teachers' fraternity will appreciate the treatment given to the courses in the syllabus

The courses are as follows: -

Semester – V		
Course Title	**Credits**	**Lecture/Week**
Artificial Intelligence	4	4
Web Services	4	4
Information and Network Security	4	4
Optimization Techniques	4	4
Skill Enhancement: Software Testing and Quality Assurance	2	2
Computer Science Practical – 11	3	6
Computer Science Practical – 12	3	6
Project Implementation	2	4

Semester – VI		
Course Title	**Credits**	**Lecture/Week**
Wireless Sensor Networks and Mobile Communication	4	4
Ethical Hacking & Cyber Forensics	4	4
Information Retrieval	4	4
Data Science	4	4
Skill Enhancement: Human Computer Interaction	2	2
Computer Science Practical – 13	3	6
Computer Science Practical – 14	3	6
Project Implementation	2	4

N.B.- (i) The duration of each theory lecture will be of 60 minutes. A course consists of 4 modules. For each module the number of hours allotted are 15. The total number of lecture hours for each course will thus be 60.

For theory component value of One Credit is equal to 15 learning hours.

(ii) There will be one practical per batch for all but one courses per semester. The duration of each practical will be of 3 hours and for project 4 hours

For practical component the value of One Credit is equal to 30 learning hours.

(iii) Thus in a week, a student will study 18 hours of theory and 16 hours of practical for semester

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Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Class Test	15 marks
Component 2 (CA-2)	Assignment/ presentation/mini project	10 marks

Minimum 2 component of Continuous Assessment need to be conducted per course.

b) Details of Semester End Examination

- **Core Component**

75% of the total marks per course. Duration of examination will be two and half hours.

Que. No.	Description	Marks	Total Marks
1	Subjective questions based on Module I (3/4)	15	20
2	Subjective questions based on Module II (3/4)	15	20
3	Subjective questions based on Module III (3/4)	15	20
4	Subjective questions based on Module IV (3/4)	15	20
5	Subjective questions based on Module I/II/III/IV (3/4)	15	20
	Total	**75**	100

- **Skill Enhancement Component**

75% of the total marks per course. Duration of examination will be two and half hours.

Que. No.	Description	Marks	Total Marks
1	Subjective questions based on Module I (3/4)	20	25
2	Subjective questions based on Module II (3/4)	20	25
3	Subjective questions based on Module III (3/4)	20	25
4	Subjective questions based on Module I/II/III (3/4)	15	20
	Total	**75**	**95**

Evaluation for practical papers

In the Practical exams, there will be 20% assessment for the journal and laboratory work and 80% as term end component to be conducted as a semester end exam per course. For each course there will be one examiner per batch who will evaluate the practical.

Signature | Signature | Signature

HOD | **Approved by Vice-Principal** | **Approved by Principal**

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Program: Bachelor of Science (Computer Science)		**Semester: V**	
Course: Artificial Intelligence		**Course Code: USMACS501**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA)**	**Semester End Examinations (SEE)**
04	4	25%	75%

Learning Objectives:

- Artificial Intelligence (AI) and accompanying tools and techniques bring transformational changes in the world. This course aims to introduce the learner to this interesting area.
- It also aims to train students to provide AI based solutions to real-world problems

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Explore fundamentals of AI and problem-solving algorithms
CO2: Implement AI models and reasoning based on probabilistic reasoning
CO3: Build decision making models based on statistical & reinforcement learning

Outline of Syllabus: (per session plan)

Module	**Description**	**No of hours**
1	Fundamentals of AI and Problem solving algorithms	15
2	Game Playing & Symbolic AI	15
3	Probabilistic Reasoning based AI	15
4	Statistical & Reinforcement learning	15
	Total	**60**

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Module	Topic	No. of Hours/Credits 60/4
1	**Fundamentals of AI and Problem solving algorithms**	**15**
	What Is AI: Foundations, History and State of the Art of AI. Intelligent Agents: Agents and Environments, Nature of Environments, Structure of Agents.	6
	Problem Solving by searching: Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.	7
	Iterative Improvement Algorithms: Hill Climbing and simulated annealing, Genetic Algorithms	2
2	**Game Playing & Symbolic AI**	**15**
	Game Playing: Overview and Example Domain, Min-max Search, Adding Alpha-Beta Cutoffs.	3
	First Order Predicate Logic -Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information	12
3	**Probabilistic Reasoning based AI**	**15**
	Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Belief Networks, Efficient Representation of Conditional Distribution, Exact inference in Bayesian network, Approximate inference in Bayesian network	8
	Probabilistic Reasoning over Time: Time and uncertainty, Inference in temporal models, Hidden Markov Models, Dynamic Bayesian Networks	7
4	**Statistical & Reinforcement learning**	**15**
	Complex Decisions: Sequential Decisions Problem, Value Iteration, Policy Iteration	3
	Statistical Learning: Learning with Complete Data, Learning with Hidden variables	3
	Reinforcement learning: Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, Applications of Reinforcement Learning.	9

ESSENTIAL READING:

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig,3rd Edition, Pearson, 2010.

SUPPLEMENTARY READING:

1. Artificial Intelligence: Foundations of Computational Agents, David L Poole, Alan K. Mackworth, 2nd Edition, Cambridge University Press ,2017.
2. Artificial Intelligence, Kevin Knight and Elaine Rich, 3rd Edition, 2017
3. The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2013

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Program: Bachelor of Science (Computer Science)			**Semester: V**
Course: Web Services			**Course Code: USMACS505**
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA)**	**Semester End Examinations (TEE)**
04	4	25%	75%

Learning Objectives:

- To be acquainted with details of web services technologies like SOAP, WSDL, and UDDI and to learn how to implement and deploy web service client and server, also comprehend the design principles and application of SOAP and REST based web services (JAX-Ws and JAX-RS), WCF service. & Graphql

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Explored to the fundamentals of Web services using SOAP.
CO2: Apply and develop Service-Oriented Applications with WCF and get familiarize with latest web service platforms
CO3: Implement Web service using Restful and node.js.
CO4: Create open source GraphQL API.

Outline of Syllabus: (per session plan)

Module	**Description**	**No of hours**
1	Introduction to Web Services using SOAP	15
2	RESTFUL Web Services	15
3	GraphQL	15
4	Apply and develop Service-Oriented Applications with WCF and get familiarize with latest web service platforms	15
	Total	**60**

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Module	Web Services	No. of Hours/Credits 60/4
1	**Introduction to Web Services using SOAP**	**15**
	Web services basics: What Are Web Services. Types of Web Services, software as a service, Characteristics of Web services, Service Oriented Architecture.	5
	Distributed computing infrastructure: Distributed computing and Internet protocols, client-server model, characteristics of overview of XML, SOAP.	5
	Building Web Services with JAX-WS, Registering and Discovering Web Services, Web Services Development Life Cycle, Developing and consuming simple Web Services across platform.	5
2	**RESTFUL Web Services**	**15**
	The REST Architectural style: Introducing HTTP, The core architectural elements of a RESTful system, Description and discovery of RESTful web services	5
	Java tools and frameworks for building RESTful web services, JSON message format and tools and frameworks around JSON, Build RESTful web services with JAX-RS APIs, The Description and Discovery of RESTful Web Services, Design guidelines for building RESTful web services, Secure RESTful web services.	5
	Introduction to Node.js, Features of Node.js, applications of Node.js, Environment Setup, Creating Node.js Application, Callback, Node Package Manager (NPM), Event-Driven Programming, Creating Web server, Express Overview.	5
3	**GraphQL**	**15**
	GraphQL: Introduction, GraphQL is the better REST, Core Concepts, Apollo client, the Schema Definition Language (SDL)	5
	Queries & amp; Mutations, Schemas and Types, Refetching queries in Apollo Client, Subscriptions	5
	GraphQL client and server, Connecting with Database via Prisma, GraphQL Tools and Ecosystem, Security.	5

4	**Apply and develop Service-Oriented Applications with WCF and get familiarize with latest web service platforms**	**15**
	What Is Windows Communication Foundation, Fundamental Windows Communication Foundation Concepts.	5
	Windows Communication Foundation Architecture, WCF and .NET Framework Client Profile, Basic WCF Programming	5
	WCF Feature Details. Web Service QoS, Introduction Latest web services platforms.	5

ESSENTIAL READING:

1. Web Services: Principles and Technology, Michael P. Papazoglou, Pearson Education Limited, 2008
2. RESTful Java Web Services, Jobinesh Purushothaman, PACKT Publishing, 2nd Edition, 2015
3. Developing Service-Oriented Applications with WCF, Microsoft and https://docs.microsoft.com/en-us/dotnet/framework/wcf/index
4. https://graphql.org/leam/ and https://www.howtographql.com

SUPPLEMENTARY READING:

1. Leonard Richardson and Sam Ruby, RESTful Web Services, O'Reilly, 2007
2. The java EE 6Tutorial, Oracle, 2013

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Program: Bachelor of Science (Computer Science)		**Semester: V**	
Course: Computer Science Practical 11 (Based on Artificial Intelligence and Web Services)		**Course Code: USMACSP512**	
Teaching Scheme		**Evaluation Scheme**	
Practical (Hours per week)	**Credit**	**Continuous Assessment (CA)**	**Semester End Examinations (SEE)**
6	3	20%	80 %

List of Practical: Artificial Intelligence	
Sr. No.	**Topic**
1	Write a program to implement Breadth first search algorithm for Romanian map problem
2	Write a program to implement Depth first search algorithm for Romanian map problem
3	Write a program to implement Iterative Deep Depth first search algorithm for Romanian map
4	Write a program to implement A* search algorithm for Romanian map
5	Write a program to implement recursive best-first search algorithm for Romanian map problem
6	Write a program to solve N-Queen problem
7	Write a program to implement Wumpus-world problem
8	Write a program to implement alpha beta search.
9	Write a program to solve Hill climbing problem.
10	Write a program to solve water jug problem

List of Practical: Web Services	
Sr. No.	**Topic.**
1	Implement and consume a simple web service.
2	Develop client, which consumes web services developed in different platform.
3	To implement the operation to receive request and return a response in two ways. a) One - Way operation b) Request-Response.
4	Write a JAX-WS web service to perform the following operations. Define a Servlet/JSP that consumes the web service.

5	Define a web service method that returns the contents of a database in a JSON string. The contents should be displayed in a tabular format OR Using JSON Implement CRUD Operation.
6	Implement a simple GraphQL query using the Node.JS.
7	Implement a simple GraphQL mutation using the Node JS.
8	Demonstrate a database connected GraphQL query using Prisma.
9	Implement a typical service and a typical client using WCF.
10	Use WCF to create a basic ASP.NET Asynchronous JavaScript and XML (AJAX) service.

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Program: Bachelor of Science (Computer Science)		**Semester: V**	
Course: Information and Network Security		**Course Code: USMACS503**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment**	**Semester End Examinations (SEE) (Marks-75 in Question Paper)**
04	4	25%	75%

Learning Objectives:

- To provide students with knowledge of basic concepts of computer security including network security and cryptography.

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Identify risk related to information and network security
CO2: Recommend various security techniques, applications and intrusion detection methods.
CO3: Apply cryptographic algorithms to maintain information security.
CO4: Differentiate between the use of cryptography and Hashing
CO5: Apply measures to prevent attacks on networks using firewall.
CO6: Formulate hash function for authentication

Outline of Syllabus: (per session plan)

Module	**Description**	**No of hours**
1	Introduction, Classical Encryption Techniques, Cryptography and RSA	15
2	Program Security	15
3	Digital Signatures and Authentication	15
4	Electronic Mail Security, Web Security, Intrusion, Firewalls	15
	Total	**60**

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Module	Information and Network Security	No. of Hours/Credits60/4
1	**Introduction, Classical Encryption Techniques, Cryptography and RSA**	**15**
	Introduction: Security Trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms	3
	Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques Steganography	7
	Block Cipher Principles, The Data Encryption Standard, The Strength of DES, AES (round details not expected), Multiple Encryption and Triple DES, Block Cipher Modes of Operation, Stream Ciphers	4
	Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems, The RSA Algorithm, Key Management: Public-Key Cryptosystems, Key Management, Diffie-Hellman Key Exchange	2
2	**Program Security**	**15**
	Program Security: Secure programs: Fixing Faults, Unexpected Behavior, Types of Flaws. Non-malicious program errors: Buffer overflows, Incomplete Mediation.	4
	Viruses and other malicious code: Why worry about Malicious Code, Kinds of malicious code, how viruses attach, how viruses gain control, Prevention	4
	Control Example: The Brain virus, The Internet Worm, Web bugs. Targeted malicious code- Trapdoors, Salami Attack.	4
	Controls against program threats- Development Controls, Peer reviews, Hazard Analysis.	3
3	**Digital Signatures and Authentication**	**15**
	Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and Macs, Secure Hash Algorithm, HMAC	6
	Digital Signatures and Authentication: Digital Signatures, Authentication Protocols, Digital Signature Standard Authentication Applications:	4

	Kerberos, X.509 Authentication, Public-Key Infrastructure Network Access Control: Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control. Wireless Network Security: Mobile Device Security, Wireless LAN Security	2 2 1
4	**Electronic Mail Security, Web Security, Intrusion, Firewalls, Biometric security**	**15**
	Electronic Mail Security: Pretty Good Privacy, S/MIME, DomainKeys Identified Mail. IP Security: Overview, Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management Web Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, HTTPS standard , Secure Socket Shell Intrusion: Intruders, Intrusion Techniques, Intrusion Detection, Firewalls: Firewall Design Principles, Types of Firewalls Security in Online transactions	3 3 3 2 2

ESSENTIAL READING:

1. Cryptography and Network Security: Principles and Practice 5th Edition, William Stallings,Pearson, 2010.
2. Cryptography and Network Security, Atul Kahate, Tata McGraw-Hill, 2013.

SUPPLEMENTARY READING:

1. Cryptography and Network, Behrouz A Fourouzan, Debdeep Mukhopadhyay,
2ndEdition, TMH, 2011.
2. Information Security Principles and Practice by Mark Stamp, Willy India Edition.

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Program: Bachelor of Science (Computer Science)		**Semester : V**	
Course: Optimization Techniques		**Course Code: USMACS504**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment**	**Semester End Examinations (SEE)**
04	4	25%	75%

Learning Objectives:

- Demonstrate the application of optimization in real life.
- Apply concepts of optimization in design of computer science.
- Develop pseudo code for analyzing optimization techniques in language and compiler design.

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Apply techniques of LPP in real life situations.

CO2: Analyze the tools available to solve various problems of assignments.

CO3: Apply numerical techniques in real life situations.

CO4: Formulate different optimization techniques and apply them.

CO5: Develop techniques of problem solving.

Outline of Syllabus: (per session plan)

Module	**Description**	**No of hours**
1	Introduction, Introduction to simplex methods	15
2	Advanced simplex methods, dual simplex algorithm and duality	15
3	Transportation and assignment models.	15
4	Solutions of Algebraic and Transcendental Equations	15
	Total	**60**

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Module	Optimization Techniques	No. of Hours/Credits 60/4
1	**Introduction, Introduction to simplex methods**	**15**
	Introduction to operation research and optimization. Need of optimization, historical development, classification and formulation of optimization problem. Classical optimization methods, calculus based methods, random search algorithm.	3
	Linear programming problem: Formulation , objective function constraints, decision variables, canonical and standard form, parameter and variables. Graphical LPP for two variables.	3
	Introduction to Simplex method : simplex algorithm and tabular representation , types of solution feasible/ non feasible , generate/ non generate , unique/alternate/ infinite , bounded/unbounded solutions and their interpretation from simplex table , mutual solutions of problem solving up to four iterations.	3
	Integer programming : branch and bound technique , cutting plane algorithm	3
	Sensitivity Analysis : change in objective function coefficient(cj), change in the coefficient of non basic variable, change in coefficient of non basic variable in cost minimization problem	3
2	**Advanced simplex methods, dual simplex algorithm and duality**	**15**
	Artificial variables, Big M methods, bounded / unbounded solution, pseudo optimum solution, degeneracy.	3
	Two Phase simplex method , dual simplex method, relationship of primal and dual , formulation of dual simplex method, rules for constructing dual from primal, advantages.	3
	Duality and computation of replacement ratio. bounded / unbounded solution, pseudo optimum solution, degeneracy.	3
	Comparison of duality and dual simplex method.	3
	Introduction to simulation : definition, working area of simulation,	

	steps of simulation process, advantages and disadvantages of simulation, role of simulation in computer science, applications introduction to sequencing problem, processing n jobs through two machines	3
3	**Transportation and assignment models.**	**15**
	Transportation and assignment models : special case of LPP model, problem formulation, transportation algorithms NWCR, LCM, VAM. Finding optimal solution using MODI method.	5
	Assignment problem and problem formulation, Hungarian method traveling sales man problem, advantages and applications of transportation and assignment model.	3
	Game theory :introduction, two person zero sum games, pure strategies , games with saddle point.	3
	Introduction to decision theory : steps in decision theory approach, types of decision making environments, decision making under uncertainty , criteria of regret.	4
4	**Solutions of Algebraic and Transcendental Equations**	**15**
	The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method.	5
	Interpolation: Forward Difference, Backward Difference, Newton's Forward Difference Interpolation	5
	Newton's Backward Difference Interpolation, Lagrange's Interpolation	5

ESSENTIAL READING:

1) Operation research –Theory and Applications , 7th Edition J K Sharma
2) Operation research – P K Gupta , Hira S Chand 2018
3) Introductory Methods of Numerical Methods S. S. Shastri PHI

SUPPLEMENTARY READING:

1) Mathematical Programming Techniques : Kambo N S , McGraw Hill
2) Numerical Analysis Richard L. Burden, J. Douglas Faires Cengage Learning 9 th 2011

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Program: Bachelor of Science (Computer Science)		**Semester: V**	
Course: Computer Science Practical 12 (Information and Network Security and Optimization Technique)		**Course Code: USMACSP534**	
Teaching Scheme		**Evaluation Scheme**	
Practical (Hours per week)	**Credit**	**Continuous Assessment (CA)**	**Semester End Examinations (SEE)**
6	3	20%	80%

List of Practical: Information and Network Security (Languages use as Python / java)	
Sr. No.	**Topic**
1	Write programs to implement the following Substitution Cipher Techniques: - Caesar Cipher - Monoalphabetic Cipher
2	Write programs to implement the following Substitution Cipher Techniques: - Vernam Cipher - Playfair Cipher
3	Write programs to implement the following Transposition Cipher Techniques: - Rail Fence Cipher - Simple Columnar Technique
4	Write program to encrypt and decrypt strings using - DES Algorithm - AES Algorithm
5	Write a program to implement RSA algorithm to perform encryption / decryption of a given string.
6	Write a program to implement the Diffie-Hellman Key Agreement algorithm to generate symmetric keys.
7	Write a program to create worm.
8	Write a program to create a virus
9	Write a program to generate SHA-512
10	Write a program to calculate HMAC-SHA1 Signature

List of Practical: Optimization Technique	
Sr. No.	**Topic.**
1	LPP by graphical minimization/ maximization of LPP
2	LPP by simplex (<=)
3	LPP by simplex using big M method
4	Transportation problems using NWCR, LCM and VAM

5	Optimization of transportation using MODI
6	Assignment problem
7	Two Phase simplex method
8	Converting primal to dual and solve by simplex
9	Game theory
10	Bisection Method, The Newton-Raphson Method

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Program: Bachelor of Science (Computer Science)		**Semester : V**	
Course: Skill Enhancement: Software Testing and Quality Assurance		**Course Code: USMACS502**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA)**	**Semester End Examinations (SEE)**
2	2	25%	75%

Learning Objectives:

- To Summarize different software testing techniques
- To articulate how testing methods can be used to ensure quality assurance in software projects
- To sketch efficient test cases

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Illustrate different testing strategies and methods with appropriate case studies
CO2: Design test plans for software projects
CO3: Use automation of test cases
CO4: Apply Selenium test cases on websites and programs

Outline of Syllabus: (per session plan)

Module	**Description**	**No of hours**
1	Software Testing and its types, Introduction to Quality	10
2	Software Metrics and Defect Management, Selenium IDE	10
3	Software Quality Assurance and Automation of Test Cases	10
	Total	**30**

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Module	Skill Enhancement: Software Testing and Quality Assurance	No. of Hours/Credits 30/2
1	**Software Testing and its types, Introduction to Quality**	**10**
	Software Testing and Introduction to quality : Introduction, Nature of errors, an example for Testing	2
	Definition of Quality , QA, QC, QM and SQA , Software Development Life Cycle, Software Quality Factors	2
	Verification and Validation : Definition of V &V , Different types of V & V Mechanisms	2
	Concepts of Software Reviews, Inspection and Walkthrough Software Testing Techniques : Testing Fundamentals, Test Case Design, White Box Testing and its types, Black Box Testing and its types.	3
2	**Software Metrics and Defect Management, Selenium IDE**	**10**
	Software Testing Strategies : Strategic Approach to Software Testing, Phases of Testing - Unit Testing, Integration Testing, Validation Testing, System Testing	3
	Software Metrics : Concept and Developing Metrics, Different types of Metrics – Size-Oriented Metrics, Function-Oriented Metrics, Halstead Metrics, Complexity metrics	3
	Defect Management: Definition of Defects, Defect Management Process, Defect Reporting, Metrics Related to Defects, Using Defects for Process Improvement.	2
	Introduction to Selenium IDE – Selenium Commands, Creating test cases in Selenium, Testing a website.	2
3	**Software Quality Assurance and Automation of Test Cases**	**10**
	Software Quality Assurance : Quality Concepts, Quality Movement, Background Issues, SQA activities, Software Reviews, Formal Technical Reviews, Formal approaches to SQA, Statistical Quality Assurance, Software Reliability	4
	The ISO 9000 Quality Standards, , SQA Plan , Six sigma, Informal Reviews Quality Improvement : Introduction, Pareto Diagrams, Cause-effect Diagrams, Scatter	

	Diagrams, Run charts Quality Costs : Defining Quality Costs, Types of Quality Costs, Quality Cost Measurement, Utilizing Quality Costs for Decision-Making Automation of Test Cases – Automation of creation and retrieval of Excel file, Counting the number of objects in a webpage	3 3

ESSENTIAL READING:

1. Software Engineering for Students, A Programming Approach, Douglas Bell, 4 th Edition, Pearson Education, 2005.
2. Software Engineering – A Practitioners Approach, Roger S. Pressman, 5 th Edition, Tata McGraw Hill, 2001

SUPPLEMENTARY READING:

1. Software engineering: An Engineering approach, J.F. Peters, W. Pedrycz , John Wiley,2004
2. Software Testing and Quality Assurance Theory and Practice, Kshirsagar Naik, Priyadarshi Tripathy , John Wiley & Sons, Inc. , Publication, 2008
3. Software Engineering and Testing, B. B. Agarwal, S. P. Tayal, M. Gupta, Jones and Bartlett Publishers, 2010

SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben Jivanlal College of Commerce & Economics (AUTONOMOUS)

Program: Bachelor of Science (Computer Science)		**Semester: V**	
Course: Project Implementation		**Course Code: USMACSP56**	
Teaching Scheme		**Evaluation Scheme**	
Learner Effort (Total Hours)	**Credit**	**Continuous Assessment (CAE)**	**Semester End Examinations (SEE)**
60 - 80	2	40%	60%

Learning Objectives:

- Identifying the problem
- Identifying suitable Technologies to create the application
- Implementing or performing experiments and develop correct practices of observing the results
- Applying various techniques to evaluate results and deferring appropriate conclusions

Course Outcomes:

After completion of the course the learners will:

CO1: Identify the domain area and apply techniques
CO2: Apply fundamental concepts of database in real life.
CO3: Apply software development lifecycle
CO4: Develop front end solutions with test cases
CO5: Create operationally feasible solutions

Guidelines for Project Implementation in Semester – V

- To ensure proper conduction of each project, progress of each project should be monitored on continuous basis first by the supervisor.
- Students are expected to create Application which has User Interface, Business Logic and Database Connectivity.
- Student must report progress of the project to faculty in-charge once a week.
- Faculty in-charge should conduct mid-semester presentations of the student project as part of continuous evaluation.
- **Evaluation scheme for continuous evaluation:**

Maximum: 40 Marks

- **Evaluation Scheme for End Semester:**

Maximum: 60 Marks

Guidelines for Documentation of Project Implementation in Semester – V

1.	Title: Title of the project
2.	Preparation of Abstract
3.	Preliminary Investigation
4.	Feasibility Study
5.	Description of Modules

6.	UML Diagrams (System Analysis and Design)
7.	The report may be of around 30-35 pages, which needs to be signed by the faculty in charge and head of the Department. Student should submit the signed project implementation report along with evaluated copy of the project proposal documentation at the time of Project evaluation and viva as part of the Term End examination
8.	Experimental set up and results: A detailed explanation on how experiments were conducted, what software used and the results obtained. Details like screen shots, tables and graphs can come here. It shall be of 10 to 15 pages.
9.	Analysis of the results: A description on what the results means and how they have been arrived at. Different performing measures or statistical tools used etc. may be part of this. It shall be of 4 to 6 pages.
10.	Testing and Writing test cases: A List of tests are performed and List of test cases identify for the project
11.	Conclusion: A conclusion of the project performed in terms of its outcome (May be half a page).
12.	Future enhancement. A small description on what enhancement can be done when more time and resources are available (May be half a page)
13.	Program code: The program code should be given as appendix. 8. The report may be of around 30 pages (excluding program code), which needs to be signed by the faculty in charge and head of the Department. Student should submit the signed project implementation report along with evaluated copy of the project proposal documentation at the time of Project evaluation and viva as part of the Term End examination.