Madhav Institute of Technology & Science Gwalior (M.P.)
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
NAAC Accredited with A++ Grade
Centre for Artificial Intelligence

CALCULUS AND OPTIMIZATION TECHNIQUES (2240421/ 2270421/ 2280421)

COURSE OBJECTIVES

- To understand the techniques of differential and integral calculus in engineering problems
- To expose the concept of ordinary differentiation equation
- To explore linear programming problem
- To understand numerical optimization

Unit 1:

Maclaurins's and Taylor's theorem, Partial differentiation, Euler's theorem, Jacobian, Maxima and Minima of one and two variables.

Unit 2:

Definite integral as limit of a sum, application in summation of series, Beta and Gamma function and its properties, transformation of Beta function, Gamma functions, transformation of Gamma function, relation between Beta and Gamma function, Legendre's duplication formula, double & triple integral, Change of order of integration, Length of the curves, Volumes and surfaces.

Unit 3:

Ordinary differential equations of first and higher order, Linear higher order differential equation with constant coefficients, Homogeneous linear differential equation and Simultaneous differential equations.

Unit 4:

Concept of optimization, constrained and unconstrained optimization, LPP formulation, Graphical method, Simplex method, Duality of LPP, Transportation and Assignment problems.

Unit 5:

Concept of numerical methods, methods for solving matrix problems and linear systems by LU decomposition: Crout & do little method, Gauss elimination, Gauss-Seidel, and Gauss Jacobi, Interpolation: finite differences, difference operators, Newton's interpolation formula, Newton's divided difference formula, Lagrange's interpolation formula, singular value decomposition.

RECOMMENDED BOOKS

- E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10 th Edition (2011).
- H. A. Taha: Operations Research an Introduction, Pearson, 9 th Edition (2014).
- R. K. Jain, S. R. K. Iyengar: Advance Engineering Mathematics, Narosa Publishing House Pvt.Ltd, 5 th Edition (2016).
- F. B .Hildebrand: Advanced Calculus for application, Englewood Cliffs, N. J. Prentice- Hall, 2 nd Edition (1980).
- J. Nocedal and S. Wright: Numerical Optimization, Springer Series in Operations Research and Financial Engineering, 2006.
- B.V. Ramanna: Higher Engineering Mathematics, McGraw Hill Education, 1 st Edition (2017).
- Introduction to Linear Optimization by Bertsimas, Tsitsiklis. MIT Press (1997)

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: Apply differential Calculus in basic engineering problems

CO2: Use integration techniques to determine the solution of various complex problems

CO3: Solve the differential equations by various methods

CO4: Find the Optimal Solution using Various Methods of Linear Programming Problem.

CO5: Evaluate the numerical techniques

Madhav Institute of Technology & Science Gwalior (M.P.)
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
NAAC Accredited with A++ Grade
Centre for Artificial Intelligence

MODERN COMPUTER ARCHITECTURE
(2240422/ 2270422/ 2280422/ 3240222/ 3270222/ 3280222)

COURSE OBJECTIVES

- To understand basic principles of Computer Systems.
- To understand various logic design techniques and their applications. They should be capable of using high performance computing architecture.

Unit I

Basic of Computer Architectures: Von Neumann Model, Various Subsystems, CPU, Memory, I/O, System Bus, Arithmetic Micro-Operation, Logic Micro Operation Shift Micro-Operation Register Transfer Micro Operations, Arithmetic, Micro-Operations, Logic Micro-Operations and Shift Micro-Operations.

Unit II

Multi-core Architecture: Memory technologies, hierarchical memory systems, the locality principle and caching, direct- mapped caches, block size, cache conflicts, associative caches, write strategies, advanced optimizations, performance improvement techniques, DRAM – organization, access techniques, scheduling algorithms, and signal systems.

Unit III

Distributed Computing Systems and Concurrency: Relation to Parallel Multiprocessors/multicomputer Systems, Distributed and Concurrent Programs, Message Passing vs. Shared Memory Systems, Synchronous vs. Asynchronous Executions, Design Issues and Challenges, Distributed Computing Technologies, Clocks and Synchronization, Global State and Distributed Transactions.

Unit IV

High Performance Computing (HPC): HPC Architecture, Parallel Processing, Parallel Memory Models, Data vs. Task Parallelism, High Throughput Computing, Vectorization, Multithreading.

Unit V

High Performance Computing with CUDA: CUDA programming model, Basic principles of CUDA programming, Concepts of threads and blocks, GPU and CPU data exchange

RECOMMENDED BOOKS

- M. Morris Mano, Computer System & Architecture, Prentice Hall of India, 2002.
- John L. Hennessy and David A Patterson, Computer Architecture-A quantitative approach, Morgan Kaufmann/ Elsevier, 4th Edition, 2007.
- Hayes. J.P, Computer architecture and organization by McGraw-Hill Companies, 1998
- Parallel Computer Architecture: A Hardware/Software Approach David Culler and J.P. Singh with Anoop Gupta, Morgan Kaufmann, 1998.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: describe the organization of modern computer architecture.

CO2: compare computer architectures and their applications.

CO3: contrast between different modes of Input-Output data transfer.

CO4: analyze the performance of pipelined and multiprocessor systems.

CO5: evaluate the performance of distributed and high-performance computing architectures.

CO6: create parallel computing and programming models to harness the power of GPUs using CUDA.

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

CONTROL SYSTEMS (2240423)

COURSE OBJECTIVES

- To understand fundamental concepts of Control systems and mathematical modeling of the system.
- To understand the concepts of time response and frequency response analysis of Control Systems.
- To understand the concepts of state variable models, controllability and observability as applicable to linear time invariant systems
- To understand and design controllers and compensators.

Unit I

Control system modeling: Basic Elements of Control System, Open loop and Closed loop systems, Differential equation – Transfer function, Modelling of Electric systems, Translational and rotational mechanical systems, Block diagram reduction Techniques, Signal flow graph.

Unit II

Time response analysis: Standard test signals, time response of first order systems, Impulse and Step Response analysis of second order systems, time domain specifications, steady state response, steady state errors and error constants, effects of P, PI, PD and PID, Analysis using MATLAB.

Unit III

Stability analysis: stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, effects of adding poles and zeros to G(s)H(s) on the root loci, Frequency Response analysis using Bode Plot, Analysis using MATLAB.

Unit IV

State variable analysis: State space representation of Continuous Time systems, State equations, Transfer function from State variable representation, Solutions of the state equations, canonical variable diagonalization, system analysis by transfer function and state space methods for continuous systems, Analysis using MATLAB.

Unit V

Concept of controllability and observability, design of state feedback controllers, Pole placement by state feedback, set point tracking controller, Compensators – Lead, Lag, and Lead Compensators. Analysis using MATLAB.

RECOMMENDED BOOKS

- Automatic control systems, Benjamin. C. Kuo, Prentice Hall of India.
- Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
- Control Systems Engineering, I.J. Nagarath & M. Gopal, New Age Pub. Company.
- Control System – Principles and Design, M. Gopal, Tata McGraw Hill.
- Feedback and Control Systems, Schaum's Outline Series, Tata McGraw Hill.
- Digital Control and State Variable Methods, M. Gopal, Tata Mcgraw Hill.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: determine the transfer function of electrical and electromechanical systems.

CO2: apply block diagram reduction and signal flow graph for simplification of system representation.

CO3: analyze the time response of the physical system.

CO4: evaluate the stability of a given system.

CO5: solve the state space model of a given system.

CO6: design control law for a given system.

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

ROBOT KINEMATICS (2240424)

COURSE OBJECTIVES

- To introduce the functional elements of Robotics
- To impart knowledge on the kinematics of mechanism
- To introduce the dynamics and control of manipulators

UNIT I

FUNDAMENTALS OF ROBOTICS: Introduction to Robotics: History, Law of Robotics: Terminologies, Classifications Overview: Links & Joints, Coordinate Systems, Work Volume, Precision, Repeatability & Accuracy Position and Orientation of Objects: Roll, Pitch and Yaw Angles, Joint Configuration of Five Types of Serial Manipulators, Wrist Configuration, Overview of end effector.

UNIT II

KINEMATICS AND ROBOT MECHANISM: Degrees of Freedoms: of various mechanisms and its application, Kinematics: Mobility Analysis, Displacement Analysis: constrained mechanisms and robots, Velocity Analysis: constrained mechanisms and robots, singularity,

UNIT III

FORWARD KINEMATIC MODELING AND DENAVIT-HARTENBERG (DH) APPROACH: Translation Matrix - Rotation matrix, Euler Angles, Quaternion Fundamental, Dot and Cross Products, Frames and Joint Coordinates, Homogeneous Transformation, D-H Convention and Procedures: Forward kinematics Solution using D-H Convention: 3R Planar mechanism, 3 DOF RRP, Cartesian, Articulated 3 DOF robots.

UNIT IV

PATH PLANNING AND APPLICATIONS: Definition: Joint space technique, Use of p-degree polynomial, Cubic Polynomial-Cartesian space Technique, Parametric descriptions, Straight line and circular paths, Position and orientation planning. Selection and Application of Serial Manipulators: Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defence, Disaster management. Applications, Micro and Nano robots, Future Applications.

UNIT V

MANIPULATOR DIFFERENTIAL MOTION, DYNAMICS AND CONTROL: Linear and angular velocities, Manipulator Jacobian-Prismatic and rotary joints, Lagrange Euler formulation, Dynamic model: Manipulator control problem, Linear control schemes, PID controller.

RECOMMENDED BOOKS

1. R.K. Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2005.
2. John J. Craig ,Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.
3. M. P. Groover, M. Weiss, R.N. Nageland N. G.Odrej, Industrial Robotics, McGraw-Hill Singapore, 1996.
4. Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression, 2010.
5. K. K.Appu Kuttan, Robotics, I K International, 2007.
6. Edwin Wise, Applied Robotics, Cengage Learning, 2003.
7. R.D.Klafter,T.A.Chimielewski and M.Negin, Robotic Engineering–An Integrated Approach, Prentice Hall of India, New Delhi, 1994.
8. B.K.Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers,Chennai, 1998.
9. S.Ghoshal, " Embedded Systems & Robotics" – Projects using the 8051 Microcontroller", Cengage Learning, 2009.
10. S. B. Nikku, Introduction to Robotics – Analysis, Control, Applications, 3rd edition, John Wiley & Sons Ltd., 2020.
11. K. Saha, Introduction to Robotics 2e, TATA McGraw Hills Education 2014.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1: illustrate the significance, social impact and future prospects of robotics and automation in various engineering applications.

CO2: describe the components and anatomy of robotic systems and basics of robotics.

CO3: explain different motions of a robotic system through kinematic modeling.

CO4: employ a suitable path planning of end-effectors for a given robotics application.

CO5: develop the dynamic model for a robot manipulator.

CO6: apply robotic control to solve real-world industrial problems.

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

INFORMATION SECURITY (2240425/ 2270425/ 2280425)

COURSE OBJECTIVES

- To provide conceptual understanding of Information security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.

Unit-I

Security: Principles and Attacks, Basic Number Theory, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: RC4, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Digital Signatures, Digital Certificates.

Unit -IV

IP Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion detection system), Firewalls: Types, Functionality and Polices.

Unit -V

Phishing: Attacks and its Types, Buffer Overflow Attack, Session Hijacking, Hacker: Hacking and Types of Hackers, FootPrinting, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1: determine symmetric and public key cryptography, classical algorithms, and basic number theory.

CO2: explain the working of various cryptographic algorithms.

CO3. apply firewall, IDS, and security protocols like SSL, TLS, and SET.

CO4: build secure systems using digital signatures, message authentication, and certificates.

CO5: examine the strengths and weaknesses of IP and web security.

CO6: select strategies for detecting and preventing attacks like sniffing, spoofing, and hacking.

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

SOFTWARE ENGINEERING (2270423/ 2280423)

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models.
- To understand project management and risk management associated with various types of projects.
- To know the basics of testing and understanding the concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, Software Model: Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. Selection Criteria of Model: Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , Types of Requirement- Functional and Nonfunctional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the concepts of software engineering.

CO2. develop the concepts related to software design & analysis.

CO3. compare the techniques for software project management & estimation.

CO4. choose an appropriate software development model for a real-life software project.

CO5. design software using modern tools and technologies.

CO6. test the software through different approaches.

Madhav Institute of Technology & Science Gwalior (M.P.)
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
NAAC Accredited with A++ Grade
Centre for Artificial Intelligence

CLOUD COMPUTING AND VIRTUALIZATION (2270424/ 2280424)

COURSE OBJECTIVES

- To understand Cloud Computing concepts, technologies, architecture and applications.
- To understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization.
- To understand different cloud programming platforms and tools to develop and deploy applications on cloud.

Unit- I

Cloud Architecture and Model: Technologies for Network-Based System, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics, Cloud Services, Cloud models (IaaS, PaaS, SaaS), Public vs Private Cloud, Cloud Solutions Cloud ecosystem, Service management, Computing on demand.

Unit- II

Virtualization: Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices. Virtual Clusters and Resource management, Virtualization for Data-center Automation.

Unit- III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

Unit -IV

Programming Model: Parallel and Distributed Programming Paradigms- MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Google App Engine (GAE), Amazon Web Service (AWS), Smart Cloud, Public Clouds and Service Offerings, Microsoft Windows Azure. Mapping Applications, Programming Support, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

Unit -V

Security in the Cloud: Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control.

RECOMMENDED BOOKS

- Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
- John W. Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
- Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
- Kumar Saurabh, "Cloud Computing — insights into New-Era Infrastructure", Wiley India,2011
- George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
- James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. describe cloud computing fundamentals.

CO2. explain architecture, infrastructure and delivery models.

CO3. apply suitable virtualization concepts based on problem characteristics.

CO4. choose appropriate programming models for a specific cloud computing application.

CO5. analyze various security issues in cloud computing.

CO6. create a secure and efficient cloud computing environment.

Madhav Institute of Technology & Science Gwalior (M.P.)
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
NAAC Accredited with A++ Grade
Centre for Artificial Intelligence

ANNEXURE-VII

Experiment list/ Lab manual/ Skill Based Mini-Project List

of

Laboratory Courses offered

for

B. Tech IV Semester

[Information Technology (Artificial Intelligence and Robotics)/ Artificial Intelligence (AI) and Data Science/ Artificial Intelligence (AI) and Machine Learning]

for batch admitted in 2022-23

(under the flexible curriculum)

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

JAVA PROGRAMMING LAB (2240426/ 2270426/ 2280426)

COURSE OBJECTIVES

- To learn how to implement object oriented design concepts with java.
- To understand java language components and how they work together in applications.
- To design and program stand-alone java applications.

Unit I

Introduction – history, features, versions, java programming environment (JDK, JVM, JRE, compiler, interpreter, applet-viewer, debugger), java as an OOP language- object, class, encapsulation, inheritance, polymorphism, abstract classes and methods, interfaces, packages.

Unit II

Strings, Exception Handling, File and Streams, Visibility, Constructors, - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Generic Classes, Collections: Interface Collection and Class Collections.

Unit III

Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Exception handling, Applets, applications vs applets.

Unit IV

Input/Output: Exploring Java I/O., Directories, -streamclasses TheBytestream:Inputstream, outputstream, file input stream, file output stream, print stream, Random_access file, the character streams, Buffered reader, buffered writer, print writer, JDBC.

Unit V

Java Networking: exploring java. Net package Networking Basics: Socket, Client server, reserved sockets, servers, Internet addressing, TCP sockets, UDP sockets, RMI: Client/Server architecture, RMI registry services, Steps of creating RMI Application and an example.

RECOMMENDED BOOKS

- "The Complete Reference Java", Naughton & Schildt, McGraw Hill.
- "Java-How to Program:" TataMcGraw Hill.2.Deitel , PearsonEducation,Asia.
- "CoreJava2" (Vol I & II) , Horstmann & Cornell , SunMicrosystems
- "Java2.0" IvanBayross, BPB publications.
- "BeginningJava2", Ivor Horton, WileyIndia.
- "Java Programming for the absolute beginners", Russell, PHI Learning

List of Programs

1. Write a program to display text on screen.
2. Write a program to show concept of class in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a program to demonstrate the use of string in JAVA.
6. Write Programs to show Inheritance and Polymorphism.
7. Write a program to show Interfacing between two classes
8. Write a program to demonstrate AWT.
9. Write a program to demonstrate multithreading using Java.
10. Write a program to demonstrate applet life cycle.
11. Write a Program to show Data Base Connectivity Using JAVA.
12. Write a Program to show "HELLO JAVA " in Explorer using Applet.

Course Outcomes of Lab:

After completion of the course students will be able to:

CO1: organize the programs as per the basic structure and model of Java programming language.

CO2: identify the use of various operators and methods in Java.

CO3: illustrate the effective use of object-oriented programming paradigm.

CO4: assess user requirements and technically map applications accordingly.

CO5: compare various approaches for implementing multithreading and network programming.

CO6: develop real world applications and softwares using Java Programming.

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

JAVA PROGRAMMING LAB (2240426/ 2270426/ 2280426)

List of Skill based Projects

List of Micro Projects:

1. Design a web based interface for converting currency from one to another.
2. Design a game of guessing the correct number in a given range of numbers.
3. Develop an E-commerce website of your choice.
4. Design a grading system for marking students in respective courses.
5. Design a supermarket billing system for fast servicing of users.

List of Macro Projects:

1. Design a simple banking application to perform routine transactions.
2. Design a system to count the number of words in a given paragraph.
3. Design a web based CGPA calculator application in java.
4. Design a system to identify patterns in supermarket dataset in terms of nature of sale.
5. Design a To-Do list application to manage your daily tasks.

List of Mini Projects:

1. Design brick breaker game in java.
2. Design an attendance management system for your department.
3. Design a tic-tac-toe gaming application using GUI.
4. Design an ATM simulation system for handling personal financial transactions.
5. Design a smart city system that acts as city guide to the new visitors.
6. Design a flappy bird game using a swing component.
7. Develop a Stock Market Analysis and Prediction system.
8. Design an online book recommendation system.
9. Build a simple search engine to facilitate web users.
10. Design a Virtual Private Network for an office.

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

ROBOT KINEMATICS (2240424)

LIST OF EXPERIMENTS

1. Study of kinematic links, pairs and chains
2. To find the degree of freedom of a given mechanism.
3. To Study Straight Line Mechanism.
4. Study of Open and Closed kinematic chain mechanism:
    a. Oldham Coupling Mechanism,
    b. A quick return mechanism and
    c. CAM follower mechanism.
5. Introduction of RoboAnalyzer software.
6. Validation of the forward kinematics of manipulators through RoboAnalyzer.
    a. Demonstration of 2D, 3D Transformation, Scaling
    b. Demonstration Rotation,
    c. Demonstration Translation,
    d. Demonstration Multiple transformation, and Homogeneous Transformations
7. Kinematics analysis of 2R Manipulators by RoboAnalyser.
8. Demonstration of D-H convention for kinematic analysis.
9. Kinematics of PUMA 560: Robot teaching
10. Study of PID controllers.

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

CLOUD COMPUTING AND VIRTUALIZATION (2270424/ 2280424)

LIST OF EXPERIMENTS

1. Install Virtualbox/VMware Workstation with different flavors of linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.
3. Install Google App Engine. Create a hello world app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Implement a procedure to transfer the files from one virtual machine to another virtual machine.
7. Implement a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like word count.

Course Outcomes of Lab:

After completion of the course students will be able to:

CO1: configure virtualization software.

CO2: develop and run programs in a virtualized environment.

CO3: develop web applications using Python or Java, employing GAE Launcher.

CO4: simulate cloud scenario using CloudSim.

CO5: manage data within virtual environments.

CO6: launch a virtual machine using OpenStack Trystack (Online OpenStack Demo Version).

Madhav Institute of Technology & Science Gwalior (M.P.)

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Centre for Artificial Intelligence

CLOUD COMPUTING AND VIRTUALIZATION (2270424/ 2280424)

SKILL BASED MINI PROJECTS

1. Develop a system that allows users to create, manage, and monitor virtual machines in a cloud environment. Include features such as starting, stopping, and resizing VMs. You can use a platform like OpenStack or VMware.
2. Implement a simple load balancer that distributes incoming network traffic across multiple servers. This can be applied to a cloud environment to ensure optimal resource utilization and performance.
3. Create an auto-scaling system that automatically adjusts the number of resources (virtual machines) based on the demand. Use metrics like CPU utilization or network traffic to trigger scaling actions.
4. Build a serverless application using platforms like AWS Lambda or Azure Functions. Develop a function that responds to a specific event and showcase the advantages of serverless architecture.
5. Design a microservices architecture using Docker containers. Each microservice should perform a specific function, and communication should happen through APIs. Deploy the microservices on a cloud platform.