RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 501- Control Systems

Unit 1: Introduction to Control System: Introduction to control system block diagram. Importance of Control Systems. Components of control. Open loop control and closed loop control. Mathematical representation of simple mechanical, electrical, thermal, hydraulic systems. Block diagram representation and reduction. Signal flow graph. Transfer function of these systems, Laplace transform, Pole zero concepts.

Unit 2: Time domain analysis: Time response of first order, second order systems. Analysis of steady state error, Type of system and steady state error, Time response specifications. Effect of parameter variation on open loop and closed loop system response, sensitivity. Effect of feedback on system response, stability and disturbance.

Unit3: Stability: Concept of stability, Effect of pole zero location on stability, Routh-Hurwitz criterion. Root Locus method for analysis of gain margin, phase margin and stability.

Unit4: Control system analysis in frequency domain: Concept of frequency domain behaviour, Bode Plot for analysing systems in frequency domain. Frequency domain performance specifications. Correlation between time domain and frequency domain specification. Nyquist Analysis.

Unit5: State Space Approach: Representation of system in state space, Converting transfer function model into state space model. Non uniqueness of state space model, Canonical representation, Eigenvalues, Solution of state equations, Concept of State feedback control, controllability, Observability.

Text/Reference Books:

1.Nagrath & M. Gopal “Control System Engineering”, Anshan, 2008.
2. Norman S. Nice, “Control System Engineering”, Wiley, 2008.
3. Smarajit Ghosh, “Control Systems Theory & Applications”, Pearson Education, 2007.
4. Katsuhiko Ogata,” Modern Control Engineering”, Prentice Hall, 2010.
5. Albert D. Helfrick, William David Cooper, “Modern electronic instrumentation and measurement techniques”, TMH 2008.
6. Oliver Cage, “Electronic Measurements and Instrumentation”, TMH, 2009.
7. Alan S. Morris, “Measurement and Instrumentation Principles”, Elsevier (Buterworth Heinmann), 2008.
8. David A. Bell, “Electronic Instrumentation and Measurements”, 2nd Ed., PHI, New Delhi 2008.
9. H.S. Kalsi, “Electronics Instrumentation”, TMH Ed. 2004
10. A.K.Sawhney, “A Course in Electrical and Electronic Measurements and Instrumentation”, Dhanpat Rai.
11. MMS Anand, “Electronic Instruments & Instrumentation Technology”, PHI Pvt. Ltd., New Delhi Ed. 2005

Experiments:

- To study input out characteristic of various control system components.
- To obtain step response and find time response specification of electrical system, hydraulic system, pneumatic system and thermal system.
- To obtain transfer function and poles zeros of DC motor using Matlab or Scilab.
- To obtain root locus experimentally.
- Use Matlab to study the effect of feedback gain on system response.
- Use Matlab to study the effect of damping factor zeta on time control performance specifications.
- Use Matlab to obtain root locus for a given system and find performance specifications there from. Study effect of addition of zero and pole on root locus.
- Use Matlab to get a bode plot and obtain gain margin and phase margin for various systems.
- Use Matlab to obtain state space representation from transfer function, find Eigenvalues, Analyze controllability, observability and stability.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 502- Machine Learning

COURSE OBJECTIVES: The objective of this course is to impart necessary knowledge of different machine learning techniques and develop programming skills required to build machine learning based applications.

COURSE OUTCOMES: After completing the course student should be able to:
1. Describe in-depth about theories, methods, and algorithms in machine learning.
2. Find and analyze the optimal hyper parameters of the machine learning algorithms.
3. Examine the nature of a problem at hand and determine whether machine learning can solve it efficiently.
4. Solve and implement real world problems using machine learning.

Unit 1: Introduction to machine learning, Machine learning life cycle, Types of Machine Learning System, scope and limitations, Challenges of Machine learning, machine learning models, Supervised Learning, Unsupervised Learning hypothesis space and inductive bias, evaluation, cross-validation.

Unit 2: Regression: simple linear, multiple linear and polynomial, classification algorithm: - Logistic Regression, Decision Tree Classification, Neural Network, K-Nearest Neighbors (K-NN), Support Vector Machine, Naive Bayes (Gaussian, Multinomial, Bernoulli). Performance Measures: Confusion Matrix, Classification Accuracy, Classification Report: Precisions, Recall, F1 score and Support.

Unit 3: Clustering in Machine Learning: Types of Clustering Method: Partitioning Clustering, Distribution Model-Based Clustering, Hierarchical Clustering. Birch Algorithm, CURE Algorithm. Gaussian Mixture Models and Expectation Maximization. Parameters estimations – MLE, MAP. Applications of Clustering.

Unit 4: Ensemble Learning and Random Forest: Introduction to Ensemble Learning, Basic Ensemble Techniques (Max Voting, Averaging, Weighted Average), Voting Classifiers, Bagging and Pasting, Out-of-Bag Evaluation, Random Forests(Extra-Trees, Feature Importance), Boosting (AdaBoost, Gradient Boosting).

Unit 5: Introduction to deep learning, difference between deep learning and machine learning, introduction to neural network, applications of machine learning and deep learning, case study: heart dieses prediction, customer churn prediction.

REFERENCE BOOKS:

1. Tom M. Mitchell, “Machine Learning”, McGraw Hill Education, First edition, 2017.
2. Aurelien Geon, “Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems”, Shroff/O'Reilly; First edition (2017).

3. Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Shroff/O'Reilly; First edition (2016).
4. Leonard Kaufman and P. J. Rousseau. Finding groups in data: An introduction to cluster analysis, Wiley, 2005
5. NelloCristianini and John Shawe-Taylor, An Introduction to Support Vector Machines, Cambridge University Press, 2000.

PRACTICAL: Different problems to be framed to enable students to understand the concept learnt and get hands-on on various tools and software related to the subject. Such assignments are to be framed for ten to twelve lab sessions

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New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 503 (A) Database Management Systems

COURSE OBJECTIVES: The objective of this course is to enable students in developing a high-level understanding of the concepts of Database management systems in contrast with traditional data management systems with emphasis on skills to apply these concepts in building, maintaining and retrieving data from these DBMS.

COURSE OUTCOMES: After completing the course student should be able to:

1. Describe design of a database at various levels and compare andcontrast traditional data processing with DBMS.
2. Design a database using Entity Relationship diagram and other design techniques.
3. Apply fundamentals of relational model to model and implement a sample Database Management System for a given domain.
4. Evaluate and optimize queries and apply concepts of transaction management.

COURSE CONTENTS:

UNIT I:DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model: Entitles and attributes, Entity types, Defining the E-R diagram, Concept of Generalization, Aggregation and Specialization. Transforming ER diagram into the tables. Various other data models object-oriented data Model, Network data model, and Relational data model, Comparison between the three typesof models.Storage structures: Secondary Storage Devices, Hashing & Indexing structures: Single level & multilevel indices.

UNIT II:Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages: SQLDDL, DML, integrity con straints, Complex queries, various joins, indexing, triggers, assertions, Relational algebra and relational calculus, Relational algebra operations like select, Project,Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

UNIT III: Data Base Design: Introduction to normalization, Normal forms- 1NF, 2NF, 3NF and BCNF, Functional dependency,Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies. Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

UNIT IV:Transaction Processing Concepts: -Transaction System, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recoveryfrom transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: Concurrency Control, locking Techniques for concurrency control, timestamping protocols for concurrency control, validation-based protocol, multiple granularities.Multi version schemes, Recovery with concurrent transaction. Introduction to Distributeddatabases, data mining, data warehousing, Object Technology and DBMS, Comparativestudy of OODBMS Vs DBMS. Temporal, Deductive, Multimedia, Web & Mobile database.

UNIT V: Case Study of Relational Database Management Systems through Oracle/PostgreSQL /MySQL: Architecture, physical files, memory structures, background process. Data dictionary, dynamic performance view. Security, role management, privilege management, profiles, invoker defined security model. SQL queries, Hierarchical quires, inline queries, flashback queries. Introduction of ANSI SQL, Cursor management: nested and parameterized cursors. Stored procedures, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers.

TEXT BOOKS RECOMMENDED:

1. Korth H.F. &Silberschatz A., Sudarshan, "Database Systems", McGraw-Hill
2. Chris J. Date, with Hugh Darwin, Addison-Wesley, "A Guide to SQL Standard".
3. Elmasri R., Navathe S.B., "Fundamentals of Database Systems", Pearson.

REFERENCE BOOKS:

1. Rob, "Database System:Design Implementation& Management", Cengage Learning.
2. AtulKahate, "Introduction to Database Management System", Pearson Educations
3. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press,TMH.
4. Paneerselvam, "Database Management System", PHI Learning

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New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 503 (B) Signal processing in Robotics

Course Objectives:

1. To study various type of signals and its characteristics
2. To study various operations on the signals.
3. To analyze the signals using Fourier transform and Laplace Transform
4. To learn the fundamentals of robotics and sensor technology
5. To understand the controlling applications of robotics using sensor responses

Course Outcomes:

After the completion of the course, student will be able to:

1. To differentiate continuous and discrete time signals
2. To analyze the sensor response using Fourier transform
3. To analyze the trajectory of sensor signal using Laplace transform
4. To understand the signal conditioning and acquisition mechanism
5. To learn the fundamentals and peripherals of robots
6. To explore sensor responses in controlling robots
7. To explore various real-time application of sensor signal in robotics

Unit 1 Introduction to Signals Continuous-time and Discrete-time Signals: Representation of signals, Signal classification, Types of signals, Operations on signals - Scaling, Shifting

Unit 2 Fourier Analysis of Continuous-time Signals Introduction to Fourier series, Gibbs Phenomenon, Continuous-time Fourier transform (CTFT), Existence, Magnitude and phase response, Parseval's theorem, Inverse Fourier transform. Relation between Laplace and Fourier transforms, Laplace Transform, Magnitude and phase response

Unit 3 signal conditioning Sensing - Pre-processing – Noise reduction, enhancement of details. Signal Conversion –Sampling, Quantization, Encoding

Unit 4 Data Acquisition and sensing in Robotics: Data Acquisition: Analog and digital data acquisition, single channel and multi-channel data acquisition **Image processing in Robotics:** Vision sensor, Introduction to computer vision, Point operators, Linear Filters, More neighbourhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations.

Unit 5 Signal processing application in Robotics Robot applications: Application of robots in surgery, Manufacturing industries, space and underwater. Humanoid robots, Micro robots, Social issues and Future of robotics.

Text/Reference Books

1. Signals and Systems, second edition-P. Rama Krishna Rao and Shankar Prakriya- Mc-Graw Hill, 2013.
2. Signals and systems, second edition-Alan. V. Oppenheim, Alan. S. Willsk,S. Hamid Nawab, PHI learning Pvt ltd,1997
3. Signals and systems, second edition - Simon Haykin, Barry VanVeen, Wiley, Wiley India, 2007.
4. Ramon Pallas-Areny, John G. Webster, "Sensors and Signal Conditioning", 2nd Edition, Wiley India Pvt. Ltd., India, 2012.

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New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 503 (C) Robotic Process Automation

Course Objectives:

1. To provide insights on robotic process automation (RPA) technology and its value proposition
2. To introduce different platforms for RPA
3. To illustrate basic programming concepts and the underlying logic/structure related to RPA
4. To describe the different types of variables, Control Flow and data manipulation techniques in a RPA platform
5. To describe automation to Email and various types of Exceptions and strategies to handle

Expected Course Outcome:

After the completion of the course, student will be able to:

1. Gain insights into Robotic Process Automation Technology
2. Demonstrate the underlying logic/structure related to RPA
3. Classify several types of data inside a workflow and, gain skills in building workflows in a RPA platform
4. Comprehend different types of variables, Control Flow and data manipulation techniques
5. Identify and understand Image, Text and Data Tables Automation

Unit 1:Introduction to Robotic Process Automation

Emergence of Robotic Process Automation (RPA), Evolution of RPA, Future of RPA, Differentiating RPA from Automation, Defining Robotic Process Automation & its benefits, What RPA is Not, Types of Bots, Application areas of RPA, How Robotic Process Automation works, RPA development methodology and key considerations.

Unit 2:Overview of Robotic Process Automation Tools

Introduction to Robotic Process Automation Tools, Basic components in a RPA platform, Installation details of RPA tools, Types of Templates, User Interface, Domains in Activities, Workflow Files in the RPA platform.

Unit 3:Process Components and Activities

Process Components and Activities: User Interface Automation Activities, System Activities, Variables, Arguments, Imports Panel and User Events

Unit 4:App Integration, Recording and Scraping

App Integration, Recording, Scraping, Selector, Workflow Activities. Example of Automate login to your (web)Email account, Recording mouse and keyboard actions to perform an operation, Scraping data from website and writing to CSV.

Unit 5:Data Manipulation and PDF Automation

Data Manipulation, Automation of Virtual Machines, Introduction to Native Citrix Automation, Text and Image Automation, PDF Automation, Computer Vision. Programming, Debugging, Error Handling, Logging, Extensions, Project Organization

Text/Reference Books:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath by Alok Mani Tripathi, Packt Publishing, Mumbai, 2018.
2. Tom Taulli, "The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems", Apress publications, 2020.
3. Richard Murdoch, "Robotic Process Automation: Guide to Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant" (1st Edition), Independently published, 2018. ISBN 978-1983036835
4. A Gerardus Blokdyk, "Robotic Process Automation RpaA Complete Guide ", 2020
5. Frank Casale, Rebecca Dilla, Heidi Jaynes and Lauren Livingston, "Introduction to Robotic Process Automation: A Primer

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New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 504 (A) Internet of Things

Course Objective:
The objective of this course is to provide an understanding of the technologies and the standards
relating to the Internet of Things and to develop skills on IoT technical planning.

Unit I IoT definition, Characteristics, IoT conceptual and architectural framework, Componentsof IoT ecosystems, Physical and logical design of IoT, IoT enablers, Modern day IoTapplications, M2M communications, IoT vs M2M, IoT vs WoT, IoT reference architecture, IoTNetwork configurations, IoT LAN, IoT WAN, IoT Node, IoT Gateway, IoT Proxy, Review ofBasic Microcontrollers and interfacing.

Unit II Define Sensor, Basic components and challenges of a sensor node, Sensor features, Sensor resolution; Sensor classes: Analog, Digital, Scalar, Vector Sensors; Sensor Types, bias,
drift, Hysteresis error, quantization error; Actuator; Actuator types: Hydraulic, Pneumatic, electrical, thermal/magnetic, mechanical actuators, soft actuators

Unit III Basics of IoT Networking, IoT Components, Functional components of IoT, IoT serviceoriented architecture, IoT challenges, 6LowPAN, IEEE 802.15.4, ZigBee and its types, RFIDFeatures, RFID working principle and applications, NFC (Near Field communication),
Bluetooth, Wireless Sensor Networks and its Applications

Unit IV MQTT, MQTT methods and components, MQTT communication, topics and applications, SMQTT, CoAP, CoAP message types, CoAP Request-Response model, XMPP, AMQP features and components, AMQP frame types

Unit V IoT Platforms, Arduino, Raspberry Pi Board, Other IoT Platforms; Data Analytics for IoT, Cloud for IoT, Cloud storage models & communication APIs, Attacks in IoT system, vulnerability analysis in IoT, IoT case studies: Smart Home, Smart framing etc.

Text/References Books:
1. Vijay Madisetti, Arshdeep Bahga, “Ïnternet of Things, A Hands-on Approach”, University Press
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, “Introduction to Internet of Things: A practical Approach”, ETI Labs
3. Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press
4. Jeeva Jose, “Internet of Things”, Khanna Publishing House, Delhi
5. Adrian McEwen, “Designing the Internet of Things”, Wiley
6. Raj Kamal, “Internet of Things: Architecture and Design”, McGraw Hill
7. Cuno Pfister, “Getting Started with the Internet of Things”, O Reilly Media

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New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 504 (B) Drone Technology and Application

Course Objective:

1. The aim of this course is to empower student to explore drones technology through their significant learning of the Components, Assembly and Calibrations.
2. Students will understand fundamental concepts of drone.
3. It ensures learning of various design models.
4. It also provide an open-access tool that facilitates drones' programming in different scenarios, applying concepts related to computer vision, artificial intelligence, automation, autonomous navigation, or control algorithms

Course Outcome:

After the completion of the course, student will be able to:

1. Understand UAV (Unmanned Aerial Vehicles) and its application along with Law enforcement required for deployment and testing
2. Gain the knowledge about the components required for UAV
3. Acquaint Design models with Path planning and Navigation
4. Simulate and Deploy Drone for real life applications by conducting experiments that facilitates drones' programming with computer vision, artificial intelligence, automation, autonomous navigation, or control algorithms.

Unit 1:Introduction of Unmanned Aerial Vehicles and its components

Introduction, Typical physical parameter, Categories of UAV, Law and Deployment Restriction on UAV, Small Unmanned Aerial Vehicle, Civilian and Military Application of UAV's. Drone Frames, Drone Motors, Sensors, Speed Controller, Flight Controller Board, Radio Transmitter and Receiver, Battery, Propellers, Connectors

Unit 2:Drone Assembling

Assembling the frame, Connecting the RC receiver and transmitter, Connecting Battery, Binding transmitter to the Receiver, Hovering, Rising/Climbing/taking off, Yaw, Protecting Drone from Crashing.

Unit 3:Quadcopter

ESP8266, Configuring Quadcopter, Frame type selection, Compass Calibration, Access calibration, Radio Calibration, Flight mode Calibration, Failsafe Calibration, GPS Tracker using ESP8266.

Unit 4:Design Models

Autopilot model, Kinematic Model of Controlled Flight, Kinematic Guidance Models, Dynamic Guidance Model.

Unit 5:Path Planning and Navigation

Path Planning: Point to Point Algorithm, Coverage Algorithm, Vision Guided Navigation: Glimbal and Camera Frames and Projective Geometry. Glimbal Pointing, Geolocation, Estimating Target Motion in the Image Plane, Time of Collision, Precision Landing

Text/Reference Books:

1. R. Jha, Theory, Design, and Applications of Unmanned Aerial Vehicles (1st Edition), CRC Press, 2016. ISBN 978-1315371191
2. Syed Omar FarukTowaha, Building Smart Drones with ESP8266 and Arduino: Build exciting drones by leveraging the capabilities of Arduino and ESP8266, Packt Publishing, 2018.
3. Randal W. Beard and Timothy W. McLain: Small Unmanned Aircraft: Theory and Practice, Princeton University Press, 2012.
4. Kenneth Munson, Jane's Unmanned Aerial Vehicles and Targets, (1st Edition), Jane's Information Group, United Kingdom ,1995, ISBN 978-0710612571.
5. Rafael Yanushevsky, Guidance of Unmanned Aerial Vehicles (1st Edition), CRC Press 2011. ISBN 978-0429109898.

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New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 504 (C) Speech and Language Processing

Course Objectives:

1. Be competent with fundamental concepts for natural language processing and automatic speech recognition
2. To understand technologies involved in developing speech and language applications.
3. To demonstrate use of deep learning for building applications in speech and natural language processing

Expected Course Outcomes:

On completion of this course, the student will be able to

1. Describe ways to represent speech and words
2. Applying Machine Learning and Deep Learning for text mining tasks
3. Use signal processing techniques to analyze/represent the speech signal
4. Execute trials of speech/language system.

Unit 1Introduction to NLP

Overview of NLP - Different levels of NLP – Problems with Syntax and Semantics - Corpora & their role in developing NLP applications – Text normalization

Unit :2 Feature Representation

One-Hot Encoding, Vector-Space Models, TF-IDF, Topic Modeling, N-grams – Smoothing – Perplexity, Word2vec embedding

Unit:3 Applications of NLP -I

Text Classification – Sentiment Analysis, Text Clustering, Named entities – CRFs for Named Entity Recognition, Text Summarization

Unit:4 Applications of NLP -II

IR based question answering system – Entity linking – Knowledge based Q&A – RNN and LSTM Networks– Chatbots – Machine translation – Encoder-decoder Networks – Beam search – Evaluation of translation.

Unit :5Speech Production, Perception and Speech Signal Processing

Fundamentals of speech production – Short-Term Fourier representation of Speech – Functions of the ear – Perception of sound – Vocal tract model Short-Time analysis of the signal – Energy – Zero crossing – Autocorrelation – Short time Fourier analysis - Spectrogram – Filter-banks – Cepstrum – Linear Predictive Coding – Mel-Frequency Cepstrum

Text Book(s)

1. Daniel Jurafsky& James H. Martin “Speech and Language Processing”, 3rd Ed., Draft Edition, 2020.
2. Nitin Indurkhya, Fred J. Damerau "Handbook of Natural Language Processing", Chapman and Hall/CRC , 2010.
3. Lawrence R. Rabiner, Ronald W. Schafe “Theory and Applications of Digital Speech Processing”, 1st Edn. Pearson, 2010.
4. Li Deng, Yang Liu "Deep Learning in Natural Language Processing", Springer, 2018.

Reference Books

1. Digital Speech Processing Using Matlab, E. S. Gopi, Springer, 2014
2 Voice Applications for Alexa and Google Assistant, Dustin Coates, Manning Publications, 2019.
3 Speech and Audio Processing A MATLAB -based Approach, Ian Vince, McLoughlin, Cambridge Press, 2016.
4. Natural Language Processing with TensorFlow, Thushan Ganegedara, Packt, 2018
5. An Introduction to Voice Computing in Python, Jim Schwoebel, NeuroLex, 2018
6. Text Analytics with Python, Dipanjan Sarkar, Apress, 2019

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Robotics and Artificial Intelligence, V Semester

RA 505 - SQL Programming

Suggested list of experiments:-

Lab Assignments:

1. Delete duplicate row from the table.
2. Display the alternate row from table.
3. Delete alternate row from table.
4. Update multiple rows in using single update statement.
5. Find the third highest paid and third lowest paid salary.
6. Display the 3rd, 4th, 9th rows from table.
7. Display the ename, which is start with j, k, l or m.
8. Show all employees who were hired the first half of the month.
9. Display the three record in the first row and two records in the second row and one record in the third row in a single sql statements.
10. Write a sql statements for rollback commit and save points.
11. Write a pl/sql for select, insert, update and delete statements.
12. Write a pl/sql block to delete a record. If delete operation is successful return 1 else return 0.
13. Display name, hire date of all employees using cursors.
14. Display details of first 5 highly paid employees using cursors.
15. Write a database trigger which fires if you try to insert, update, or delete after 7'o' clock.
16. Write a data base trigger, which acts just like primary key and does not allow duplicate values.
17. Create a data base trigger, which performs the action of the on delete cascade.
18. Write a data base trigger, which should not delete from emp table if the day is Sunday.
19. In this subject the students are supposed to prepare a small database application in complete semester like financial accounting system, Railway reservation system,institute timetable management system. Student record system, library management system, hospital management system etc. in RDBMS as follows:

Section A: Solving the case studies using ER datamodel (design of the database)

Section B: Implement a miniproject for the problem taken in section A.

Suggested Reading:-

1. Date C J, "An Introduction To DatabaseSystem", Pearson Educations
2. Korth, Silbertz,Sudarshan, "Fundamental of Database System", McGraw Hill
3. Rob, "Data Base System:Design Implementation & Management", Cengage Learninig
4. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Educations
5 . Atul Kahate, " Introduction to Database Management System", Pearson Educations
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press,TMH.
7. Paneerselvam,DataBase Management System", PHI Learning
8. dev.mysql.com 9. www.postgressql.org

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New Scheme Based On AICTE Flexible Curricula

Robotics and Artificial Intelligence, V Semester

RA 506- Introduction to robot programming

- Robot Programming using Flex Pendant- Lead through programming including Coordinate systems of Robot.
- Wrist Mechanism-Interpolation-Interlock commands.
- VAL language commands motion control, hand control, program control, pick and place applications.
- Palletizing applications using VAL.
- Object detection and Sorting.
- Robot welding application using VAL program.
- RAPID Language and AML.
- Programming using Robot studio software.

Suggested Text Books:

(i) Hughes Cameron, "Robot Programming", Pearson Publishers, 2016.

(ii) J. Srinivas, "Robotics: Control and Programming", Narosa Publication, 2009.

Suggested Reference Books:

(i) Lentin Joseph, "Learning Robotics Using Python", Second Edition Design, simulate, program, and prototype an autonomous mobile robot using ROS, OpenCV, PCL, and Python, Packt Publishing Paperback – 1 January 2018.

(ii) Staple Danny, "Learn Robotics Programming", Packt Publishing Limited, Feb 2021.

(iii) Kailashi Chandra Mahajan, Prashant Kumar Patnnaik, Raghvendra Kumar, "Robotics for Engineers", Vikas Publishing House, 2016.

Course Outcomes:

At the end of this course, the students will be able to:

- Use fundamental and technical knowledge of robot Programming.
- Learn Robot Programming using teach Pendant for various applications.
- Use RAPID Language and AML.
- Program a Robot for Industrial applications.
- Program using Robot studio software.