# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII- Semester

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| **AB 701** | **Computer Integrated Manufacturing** | **2L-1T-2P** | **4 Credits** |

### Course Outcomes:

After studying this course, students will be able to;

- Build up the concept of Automation, CIM, CAD, CAM
- Differentiate Production Planning and Control and Computerized Process Planning
- Solve problems related to Robot Accuracy and Repeatability.
- Prepare part programs for simple jobs on CNC machine tools and robot programming..
- Develop an FMS (Flexible Manufacturing System) layout for given simple part family, using group technology concepts and familiarize with computer aided process planning.

### Syllabus:

**Module 1: Introduction**

CIM – definition, scope and elements of CIM system-benefits, Production system facilities – low-medium-high-Manufacturing support systems-Automation in production systems, Automated manufacturing systems-Computerized Manufacturing Support Systems-Reasons for Automating, Automation principles and strategies-USA Principle-Ten Strategies for Automation and Production Systems, Automation –definition- Basic elements of an automated system - Levels of automation.

**Module 2: NC and CNC Machines**

Fundamentals of NC Technology- Basic Components of an NC System- NC Coordinate Systems-Motion Control Systems, Applications of NC- Machine Tool Applications- Other NC Applications-Advantages and Disadvantages of NC, Computer Numerical Control Features of CNC- The Machine Control Unit for CNC- CNC Software, CNC Applications Advantages and Disadvantages of CNC, DNC-Direct Numerical Control- Distributed Numerical Control

**Module 3: CNC Part Programming**

Introduction to Part Programming-Coordinate system-Dimensioning-Axes & motion nomenclature Definition and importance of various positions like machine zero, home position, and work piece zero, CNC part programming- Structure of part programme-Word addressed format-Preparatory function(G)-Miscellaneous function(M)- Tool compensation Subroutines (Macros)(L)-Canned cycles-Mirror image, Simple program on Milling and Turning operations.

**Module 4: Group Technology and CAPP**

Group technology-Definition-Advantages and limitations of GT-Part family formation , Classification and coding-Opitz coding system, Applications & benefits of GT, Cellular manufacturing-Machining cell designs-Machining cell planning, Computer aided process planning-Approaches to CAPP-Implementation techniques-Essential elements in a retrieval type CAPP system-Essential elements in a generative CAPP system, Flexible manufacturing system-Scope of FMS-FMS compared to other types of manufacturing approaches-Types of FMS-Benefits of FMS-Major elements of FMS

**Module 5: Automated Guided Vehicle System (AGVS) and Industrial Robotics**

Automated Guided Vehicle System (AGVS) – AGVS Application – Vehicle Guidance technology – Vehicle Management & Safety.

Robot Anatomy and Related Attributes – Classification of Robots- Robot Control systems – End Effectors – Sensors in Robotics – Robot Accuracy and Repeatability - Industrial Robot Applications – Robot Part Programming – Robot Accuracy and Repeatability – Simple Problems.

## REFERENCES:


1. Mikell.P.Groover “Automation, Production Systems and Computer Integrated Manufacturing”, Prentice Hall of India, 2008.
2. Radhakrishnan P, Subramanyan S.and Raju V., “CAD/CAM/CIM”, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000
3. S.Kant Vajpay; Principles of CIM; PHI
4. Rao PN; CAD/CAM;TMH
5. Rao PN, Tiwari NK, Kundra TK; Computer Aided Manufacturing; TMH
6. Alavudeen A, Venkteshwarn N; Computer Integrated Mfg; PHI


**List of Experiments (please expand it):**

1. 2D and 3D modeling on CAD software
2. Use of CAM software for writing CNC programs
3. Study of automatic and semi automatic control system and writing the electrical analogy.

4. Production & layout for GT for group of jobs to be manufactured
5. A case study / tutorial using CAPP Software
6. Writing M & G codes for given operations.
7. Robot and AGV programming

**LIST OF SOFTWARES/ LEARNING WEBSITES:**

i. http://www.nptel.ac.in
ii. http://www.youtube.com/watch?v=M3eX2PKM1RI
iii. http://www.youtube.com/watch?v=EHQ4QIDqENI&list=PLBkqkLQO2nAt5MNLo
iv. http://www.youtube.com/watch?v=hJFLcvtiNQ
v. http://www.youtube.com/watch?v=BIM1AyxfYkw .
vi. http://www.mtabindia.com vii. http://www.swansoftcncsimulator.com

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## New Scheme Based On AICTE Flexible Curricula
## Automation and Robotics Engineering, VII- Semester

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|---|---|---|---|
| **AB-702 (a)** | **Farm Automation** | **3L-1T-0P** | **4 Credits** |

## Course Objectives:

After studying this course, students will be able to;

1. Design tillage tools and understand concept of hitching systems and controls
2. Compare Principles of fruit harvesting tools and machines
3. Design irrigation field channels, underground pipe conveyance system, irrigation structures, channel lining; land grading.
4. Implement good practices adopted for processing of farm crops; cereals, pulses, oil seeds, fruits and vegetables
5. Compare Ackerman and hydraulic steering and hydraulic systems used in Tractor systems

**Module 1 Introduction:** Need and importance, basic concepts, Objectives of farm mechanization. Classification of farm machines. Materials of construction & heat treatment. Principles of operation and selection of machines used for production of crops. Field capacities & economics. Tillage; primary and secondary tillage equipment. Forces acting on tillage tools. Hitching systems and controls. Draft measurement of tillage equipment.,

**Module 2 Farm Machinery & Equipment**

Principles & types of cutting mechanisms. Construction & adjustments of shear & impact-type cutting mechanisms. Crop harvesting machinery : mowers, windrowers, reapers, reaper binders and forage harvesters. Forage chopping & handling equipment. Threshing mechanics & various types of threshers. Threshers, straw combines & grain combines, maize harvesting & shelling equipment, Root crop harvesting equipment - potato, groundnut etc., Cotton picking & Sugarcane harvesting equipment. Principles of fruit harvesting tools and machines. Horticultural tools and gadgets. Testing of farm machine. Test codes & procedure. Interpretation of test results. Selection and management of farm machines for optimum performance.

**Module 3 Irrigation Engineering**

Irrigation Engineering: Irrigation, impact of irrigation on Human Environment, some major and medium irrigation schemes of India, purpose of irrigation, sources of irrigation water, present status of development and utilization of different water resources of the country; Measurement of irrigation water, weir, notches, flumes and orifices and other methods; water conveyance, design of irrigation field channels, underground pipe conveyance system, irrigation structures, channel lining; land grading

**Module 4 Crop Process Engineering**

Scope and importance of food processing, principles and methods of food processing. Processing of farm crops; cereals, pulses, oil seeds, fruits and vegetables and their products for food and feed. Processing of animal products.

**Module 5 Tractor Systems and Controls**

Study of transmission systems, clutch, gear box, differential and final drive mechanism. Familiarization of brake mechanism. Ackerman and hydraulic steering and hydraulic systems. Tractor power outlets: P.T.O., belt pulley, drawbar, etc. Tractor chassis mechanics and design for tractor stability. Ergonomic considerations and operational safety.

**REFERENCES:**

1. Srivastava, A.K., Goering, C.E., Rohrbach, R.P. and Buckmaster, D.R. 2013. Engineering Principles of Agricultural Machines, 2nd Edition. ASABE, St. Joseph, USA.
2. Kepner, R.A., Bainer, R. and Berger, E.L. 1978. Principles of Farm Machinery. John Wiley and Sons,New York.
3. Singh, T.P. 2017. Farm Machinery. PHI Learning Pvt. Ltd., Delhi.
4. Singh, S. 2007. Farm Machinery Principles and Applications. ICAR, New Delhi.
5. MacMillan, R.H. 2002. Mechanics of Tractor Implement Performance. University of Melbourne.
6. Bernacki, H., Haman, J. and Kanafojski, Cz. 1972. Agricultural Machines: Theory and Construction. U.S. Dept. of Commerce, National Technical Information Service, Springfield, Virginia.
7. Liljedahl, J.B.,Turnquist, P.K., Smith, D.W. and Hoki, M. 2004. Tractors and their Power Units, 4th Edition. CBS Publishers & Distributors, New Delhi.

# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

## New Scheme Based On AICTE Flexible Curricula
## Automation and Robotics Engineering, VII-Semester

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| **AB-702 (b)** | **Totally Integrated Automation** | **3L-1T-0P** | **4 Credits** |

**Course Objectives:** Automation is playing a key role in Industries. Industries rely heavily on automation for economic viability and mass production. It is important for the students to learn basic of automation, how system works and importance of PLC, SCADA and robots in automation. This course will provide opportunity to learn industrial automation techniques.
After learning the course , students will be able to:

- To gain knowledge in automation in industries.
- To gain knowledge in various electrical and electronic programmable automation and their applications.
- To know about the basics in SCADA and DCS systems.
- To gain knowledge in communication protocols in an integrated system
- To know about the advanced in automation industries

**Syllabus**

**Module 1: Introduction**

Need for Total Integration System (TIA), TIA Architecture ,Components of TIA systems ,Selection of TIA , Components, Programmable Automation Controllers (PAC), Vertical Integration structure.

**Module 2: Supervisory Control and Data Acquisition (SCADA):** Overview , Developer and runtime packages, Architecture, Tools, Tags, Graphics. Alarm logging , Tag logging, Trends .History , Report generation, VB & C Scripts for SCADA application.

**Module 3: Communication Protocols of SCADA**

Proprietary and open Protocols, OLE/OPC, DDE, Server/Client Configuration, Messaging , User administration – Interfacing of SCADA with PLC, drive, and another field device.

**Module 4**: **Industrial Plant Design**:

Design criteria – Process sequencing - Plant layout modeling – Selection of industrial power and automation cables, Overview of plant simulation software.

**Module 5: Case Studies**:

Case studies of Machine automation, Process automation.

**REFERENCE BOOKS:**


1. Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies.
2. Process Control Instrumentation Technology By. C.D. Johnson, PHI.
3. Industrial control handbook, Parr, Newnem.
4. David Bailey, Edwin Bright, ―Practical SCADA for industry‖, Newnes, Burlington, 2003.
5. Gordon Clarke, Deon Reyneders,Edwin Wright, ―Practical Modern SCADA Protocols: DNP3, 60870.5 and Related systems‖, Newnes Publishing, 2004
6. William T Shaw, ―Cybersecurity for SCADA systems‖, PennWell, 2006.
7. Stuart G McCrady, ―Designing SCADA Application Software‖, Elsevier, 2013.
8. SIMATIC STEP 7 in the Totally Integrated Automation Portal‖, SIEMENS AG, 2012.

# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII- Semester

| AB-702 (c) | Programming for Robot Operating System | 3L-1T-0P | 4 Credits |
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This course gives an introduction to the Robot Operating System (ROS) including many of the available tools that are commonly used in robotics as well as programming for ROS.. With the help of different examples, the course will provide a good starting point for students to work with robots. They learn how to create software including simulation, to interface sensors and actuators, and to integrate control algorithms

### Course Outcomes :

After studying this course, students will be able to;

1. Learn about ROS architecture: Master, nodes, topics, messages, services, parameters and actions
2. Console commands: Navigating and analyzing the ROS system and the catkin workspace
3. Create ROS packages: Structure, launch-files, and best practices
4. Create ROS C++ client library (roscpp).also Create own ROS C++ programs
5. Perform simulation with ROS: Gazebo simulator, robot models (URDF) and simulation environments (SDF)

**Module 1 ROS Architecture & Philosophy**

ROS master, nodes, Console commands, Catkin workspace and build system ,Launch-files, Gazebo simulator, Programming Tools

**Module 2. ROS Package Structure**

Integration and programming with Eclipse, ROS C++ client library (roscpp) , ROS subscribers and publishers . ROS parameter server.RViz visualization

**Module 3 Simulating with RO System**

TF Transformation System , RQT User Interface , Robot models (URDF) , Simulation descriptions (SDF). Gazebo simulator.

**Module 4. ROS services**

ROS actions (actionlib) , ROS time, ROS bags, Debugging strategies, Introduction to ROS2

**Module 5 Case Study:**

Using ROS in complex real-world applications.

**References:**

1.Programming Robots with ROS" by Morgan Quigley, Brain Gerkey & William Smart.
2.Introduction to Robotics" by John Craig

**Useful Websites:**

1.D. Jud, M. Wermelinger, M. Hutter, Programming for Robotics - Introduction to ROS, https://rsl.ethz.ch/education-students/lectures.html

2. http://web.ics.purdue.edu/~rvoyles/Classes/ROSprogramming/index.html

# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII- Semester

| AB-703 (a) | Entrepreneurship Development | 3L-0T-0P | 3 Credits |
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**Course Outcomes:**

After studying this course, students will be able **;**

1. To understand the basics of Entrepreneurship concepts
2. To have concepts of need, want and demand as well as to know about marketing environment, CRM and market research
3. To compare TQM ,QFD and six sigma
4. To understand the fundamentals of plant economics
5. To compare theories of entrepreneur

**Syllabus**

**Module 1: Entrepreneurship Fundamentals**

Entrepreneur: Concept, Characteristics, Types of Entrepreneurs, Difference between Entrepreneur and Intrapreneur, Functions of Entrepreneur / Start up, Obstacle in entrepreneurship

**Module 2: Marketing:**

Importance, definition, core concepts of need want and demand, exchange & relationships, product value, cost and satisfaction (goods and services ) marketing environment; selling, marketing and societal marketing concepts; four P's, product, price, placement, promotion; consumer, business and industrial market, market targeting, advertising, publicity, CRM and market research. Finance: Nature and scope, forms of business ownerships, balance sheet, profit and loss account, fund flow and cash flow statements, breakeven point (BEP) and financial ratio analysis

**Module 3: Productivity and Operations:**

Productivity, standard of living and happiness, types of productivity, operations (goods and s ervices) Vs project management, production processes and layouts, steps in method improvement, time measurement, rating and various allowances; standard time and its utility, predetermined motion and time method, product and process specification, TQM, cost of quality, introduction to lean manufacturing (JIT), QFD, TPM & six sigma quality.

**Module 4: Plant Economics:**

Interaction between design and cost equations for optimal design of equipments, inflation, energy conservation and environmental control, economic design criteria, terms involved in profitability analysis, Gross income, depreciation, net profit.

**Module 5 : Theories of Entrepreneur:**

Definition and concepts, characteristics, compression with manager, classification, theories of entrepreneur, socio, economic, cultural and psychological; entrepreneur traits and behavior, roles in economic growth, employment, social stability, export promotion and indigenization, creating a venture, opportunity analysis competitive and technical factors, sources of funds, entrepreneur development program.

**REFERENCES:**


1. Peter MS, Timmerhaus KD; Plant design and economics for chemical engr; TMH
2. . Schwery HE; Process engg economics; TMH
3. Daft R; The new era of management; Cengage
4. . Bhat Anil, Arya kumar; Management: Principles ,Processes Practices; Oxford H E
5. Khan, Jain; Financial Management;
6. Mohanty SK; Fundamental of Entrepreneurship; PHI.
7. Kuratko, Hoolgetts; Entrepreneurship; Theory Process practice; Cengage.

# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII-Semester

| AB-703 (b) | Industry 4.0 | 3L-0T-0P | 3 Credits |
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**Course Objectives:**

- To impart basic idea in Industry 4.0.
- To provide students with good depth of knowledge of designing Industrial 4.0 Systems for various application.
- Learn the design and analysis of Industry 4.0 systems for Energy and smart vehicular applications.

**Syllabus:**

**UNIT 1: Introduction to Industry 4.0**

Introduction, Historical Context, General framework, Application areas, Dissemination of Industry 4.0 and the disciplines that contribute to its development, Artificial intelligence, The Internet of Things and Industrial Internet of Things, Additive manufacturing, Robotization and automation, Comparison of Industry 4.0 Factory and today's Factory, Current situation of Industry 4.0. Introduction to Industry 4.0 to Industry 5.0 Advances

**UNIT 2: Industry 4.0 and Cyber Physical System**

Introduction to Cyber Physical Systems (CPS), Architecture of CPS- Components, Data science and technology for CPS, Emerging applications in CPS in different fields. Case study: Application of CPS in health care domain.

**UNIT 3: Smart Energy Sources**

Energy Storage for Mitigating the Variability of Renewable Electricity Sources-Types of electric energy storage, Potential of Sodium-Sulfur Battery Energy Storage to Enable Integration of Wind-Case study. Electric Vehicles as Energy Storage: V2G Capacity Estimation.

**UNIT 4: New Business Models**

How CPS can induce new Business Models, The Role of horizontal and vertical value streams .New Business Models for the Smart Factory. Characteristics of Business Models within the Smart Factory. Examples of new Business Models - Business Model: Service provider - Business Model: Data provider Business Model: Technology provider - Business Model: Platform provider

**UNIT 5: Smart Applications**

Understanding Smart Appliances -Smart Operation-Smart Monitoring-Smart Energy Savings-Smart Maintenance, Case study-Smart Cars, Self-Driving Cars, Introducing Google‘s Self-Driving Car, Intellectual Property Rights.

**COURSE OUTCOMES**

On completion of the course, student will be able to

CO1 - Understand the basic concepts of Industry 4.0 and the other related fields.
CO2 – Understand cyber physical system and the emerging applications.
CO3 - Analyze the different new business models
CO4 – Implement the industry 4.0 to solve engineering problems...
CO5 – Design of smart vehicle and analyze its performance..

**TEXT / REFERENCE BOOKS**


1.Jean-Claude André, ―Industry 4.0‖, Wiley- ISTE, July 2019, ISBN: 781786304827,2019.

2. Diego Galar Pascual, Pasquale Daponte, Uday Kumar, ―Handbook of Industry 4.0 and SMART Systems‖ Taylor and Francis,2020

3. Miller M, ―The internet of things: How smart TVs, smart cars, smart homes, and smart cities are changing the world‖, Pearson Education, 2015, ISBN: 9780134021300.

4. Pengwei Du and Ning Lu, ―Energy storage for smart grids: planning and operation for renewable and variable energy resources VERs ‖, Academic Press, 2018, Reprint edition , ISBN-13:978-0128100714

5.Hossam A. Gabbar, ―Smart Energy Grid Engineering‖, Academic Press, 2017, ISBN 978- 0-12-805343-0.
6.Mini S. Thomas, John Douglas McDonald, ―Power System SCADA and Smart Grids‖, CRC Press, 2017.

# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII-Semester

| AB-703 (c) | Data Science using R Programming | 3L-0T-0P | 3 Credits |
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**Course Objectives:**

In this course, students will learn how to program in R and how to use R for effective data analysis and visualization.

**Course Outcomes:**

By the end of the course students shall be confident and equipped with all the knowledge required to perform analytical activities in R. Specifically,

• Understand the fundamental syntax of R through readings, practice exercises, demonstrations, and writing R code.

• Apply critical programming language concepts such as data types, iteration, control structures, functions, and boolean operators by writing R programs and through examples

• Import a variety of data formats into R using RStudio

• Prepare or tidy datas for in preparation for analysis

• Query data using SQL and R

• Analyze a data set in R and present findings using the appropriate R packages

• Visualize data attributes using ggplot2 and other R packages.

**Module 1: R Introduction**

Overview of R Programming, Downloading and installing, Help of Function, Viewing documentation, General issues in R, Package Management

**Module 2 : Data Inputting in R and Data Visualization**

Data Types, Subsetting, Writing data, Reading from csv files, Creating a vector and vector operation, Initializing data frame, Control structure, Re-directing R Output

Data Visualization; Creating bar chart and dot plot, Creating histogram and box plot, Plotting with base graphics, Plotting and coloring in R

**Module 3 :Basic Statistics, Functions and Programming in R**

Computing Basic Statistics, Measures of central tendency , Measures of variability , Skewness and kurtosis , Summary functions, describe functions, and descriptive statistics by group , Correlations, Comparing means of two samples, Testing a proportion, Data Munging Basics

Functions and Programming in R ; Flow control: For loop, If condition, Debugging tools

**Module 4: Data manipulation in R**

List Management, Data Transformation, Merging Data Frames, Outlier Detection, Combining multiple vectors

**Module 5: R Database and Statistical Modelling in R**

Performing queries, RODBC and DBI Package, Advanced Data handling, Combined and restructuring data frames

Statistical Modelling in R; Logical Regression, Hierarchical Clustering PCA for Dimensionality Reduction

**REFERENCES:**

1. Wickham, H. & Grolemund, G. (2018). for Data Science. O'Reilly: New York. Available for free at http://r4ds.had.co.nz

**Required software**

- R: http://www.r-project.org/ (FREE)
- RStudio (additional libraries required): http://www.rstudio.com/ (FREE)

**Learning resources**

- R Project: http://www.r-project.org/
- RStudio (additional libraries required): http://www.rstudio.com
- Quick-R http://www.statmethods.net/
- Google's R Style Guide http://google-styleguide.googlecode.com/svn/trunk/ Rguide.xml Academic honor code

# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII-Semester

| AB-704 | Materials Handling Laboratory | 0L-0T-6P | 3 Credits |
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**Suggested List of Experiments**

1. To determine the average particle size of a mixture of particles by sieve analysis

2. To Study the operation of Jaw crusher and thereby verification of Rittinger's constant and to determine the reduction ratio, maximum feed size and theoretical capacity of crushing rolls

3. To find out the enrichment of the coal sample by forth floatation cell

4. To find out the effectiveness of a vibrating screen.

5. To study the operation of a Hammer mill and a pulveriser and finding their reduction ratio

6. To study the operation of a cyclone separator and finding their efficiency

7. To determine the angle of repose of sand particles using sieve analysis

8. To study the operation of magnetic separator and finding their efficiency.

9. To Study the operation of Roll crusher and thereby verification of Rittinger's constant and

to determine the reduction ratio, maximum feed size and theoretical capacity of crushing rolls

**Evaluation:** Evaluation will be continuous and integral part of the class as well as through external assessment (Viva/voce)

# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII-Semester

| AB-705 | MATLAB and R Programming | 0L-0T-6P | 3 Credits |
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The purpose of this laboratory is to provide the knowledge of latest research tools/techniques such as MATLAB and R Programming which is being used in finding out the solution of most of the engineering problems. MATLAB is a multi-paradigm numerical computing environment and proprietary programming language developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages.

**Suggested List of Experiments: (Atleast 10 Experiments)**

**R Programming**:

1.Study of basic Syntaxes in R
2. Implementation of vector data objects operations
3. Implementation of matrix, array and factors and perform va in R
4. Implementation and use of data frames in R
5. Create Sample (Dummy) Data in R and perform data manipulation with R
6. Study and implementation of various control structures in R
7. Data Manipulation with dplyr package
8. Data Manipulation with data.table package
9. Study and implementation of Data Visualization with gg plot2
10. Study and implementation data transpose operations in R

**MATLAB Programs**:

Following are the suggested list of experiments related to MATLAB (Pl expand)

1. Introduction to MATLAB
2. Working with matrices
3. Rational and logical operation of MATLAB
4. Creating a plot using Plot function
5. Complex and statistical functions (e,g.: Produce ten elements vector of random complex numbers and find the summation of this vector)
6. Numbers and strings (1.Write a program in M-File to read 3 x 3 Matrix, then display the diagonal of matrix as shown below: The Diagonal of This Matrix = [ ] 2.Write a program to read a string, then replace each character in the string with its following character in ASCII code*.)

7.Write a function that will receive as an input argument a temperature in degrees Fahrenheit, and will return the temperature in both degrees Celsius and Kelvin. The conversion factors areC = (F –32) * 5/9 and K = C + 273.15. Write a script to use the developed function

8.Write a script that will:a. Call a function to prompt the user for an angle in degrees.b. Call a function to calculate and return the angle in radians.c. Call a function to print the result.Write all of the functions as well. Note that the solution to this problem involves four M-files:one which acts as a main program (the script shown below), and three for the functions.

9.Write a program to print a length conversion chart. It will print lengths in feet, from 1 to an integer specified by the user, in one column and the corresponding length in meters (1 foot = 0.3048 m)in a second column. The main script will call one function that prompts the user for the maximum length in feet; this function must error-check to make sure that the user enters a valid positive integer. The script then calls a function to write the lengths to the screen.

**Evaluation:** Evaluation will be continuous and integral part of the class as well as through external assessment (Viva/voce)

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## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII-Semester

| AB-706 | Major Project -I | 0L-0T-8P | 4 Credits |
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**Objectives of the course Major Project** I:

- To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
- To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
- To give students an opportunity to do some thing creative and to assimilate real life work situation in institution.
- To adapt students for latest development and to handle independently new situations.
- To develop good expressions power and presentation abilities in students.

The focus of the Major Project I is on preparing a working system or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write up i.e. detail project report. The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need analysis market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan. Each student is required to prepare a project report and present the same at the final examination with a demonstration of the working system (if any)

**Working schedule**:

The faculty and students should work according to following schedule: Each student undertakes substantial and individual project in an approved area of the subject and supervised by a faculty of the department. In special case, if project is huge, then maximum 03 students may be permitted to work together as a team to do the same. The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty and Head of department.

Project guide should motivate students to develop some Innovative working models in the emerging area Robotics and Automation, Advanced Automotives, Aero modelling, Renewable Energy based systems, Mechatronics,Robotic systems, Advanced Manufacturing Technology based systems etc. which can contribute to the society.

**Evaluation:** There will be both external and internal evaluation of project carried out by each student.

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## New Scheme Based On AICTE Flexible Curricula

## Automation and Robotics Engineering, VII-Semester

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| **AB-707** | **Internship- III** | **0L-0T-6P** | **3 Credits** |

**Evaluation:**

Internal Evaluation will be done on the basis of Internship/industrial training (real time) carried out in industry/research center. Preference should be given to Public sectors, Govt and reputed Limited companies/research organizations. A detailed report may be submitted in the department after successful completion of internship.

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