ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24

INDUSTRIAL IoT

SEMESTER VI

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of hours for ESE
				L	T	P		Mid Sem Exam	Continual Assessment	End Sem Examination	Total	
1	PCC	**23II601T**	Artificial Intelligence and Machine Learning	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
2	PCC	**23II601P**	Artificial Intelligence and Machine Learning Lab	**-**	**-**	**2**	**1**	-	**25**	**25**	**50**	-
3	PCC	**23II602T**	Foundations of Data Science	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
4	PCC	**23II602P**	Foundations of Data Science Lab	**-**	**-**	**2**	**1**	-	**25**	**25**	**50**	-
5	PCC	**23II603T**	Industrial Automation	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
6	PCC	**23II603P**	Industrial Automation Lab	**-**	**-**	**2**	**1**	-	**25**	**25**	**50**	-
7	PEC	**23II604T**	Program Elective- II	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
8	AEC	**23AS601T**	Economics & Management	**2**	**-**	**-**	**2**	-	**15**	**35**	**50**	**1.5**
9	OE	**23II661O**	Open Elective- III	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
10	ELC	**23II605P**	Project – I	**-**	**-**	**2**	**1**	-	**50**	**50**	**100**	-
11	SEC	**23II641P**	Career Development -VI	**-**	**-**	**2**	**1**	-	**50**	**-**	**50**	-
12	MDM	**23II631M**	Multidisciplinary Minor - IV	**3**	**-**	**-**	**3**	**15**	**15**	**70**	**100**	**3**
			Total	**20**		**10**	**25**	**90**	**280**	**580**	**950**	-

Program Elective-II	
23II604T (i)	Control Systems
23II604T (ii)	Signals and Systems

Open Elective – III	
23II661O (i)	Fundamentals of Industry 4.0 & Industrial IoT
23II661O (ii)	Robotics

Multidisciplinary Minor - IV	
23II631M	IoT Connectivity and Communication Protocols

		July 2025	**NEP 1.0**	**Applicable for 2025-26**
Chairman - BoS	**Dean – Academics**	**Date of Release**	**Version**	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
23II601T	Artificial Intelligence and Machine Learning	3	---	---	3	15	15	70	100

Course Objectives	Course Outcomes
1. Introduce the foundational concepts of Artificial Intelligence and intelligent systems. 2. Explain AI problem formulation and search strategies for problem solving. 3. Provide a basic understanding of Machine Learning and its workflow. 4. Teach supervised learning concepts with emphasis on regression techniques. 5. Introduce unsupervised learning methods such as clustering and association analysis.	1 Explain the fundamentals, types, and applications of Artificial Intelligence. 2 Formulate problems and apply search techniques for AI problem solving. 3 Understand basic machine learning concepts, data preprocessing, and evaluation. 4 Apply supervised learning regression models to simple datasets. 5 Apply unsupervised learning techniques such as clustering and association rules.

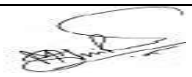
Unit I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE	**[9 Hrs]**
Definition and evolution of AI, characteristics and applications of AI, types of AI (narrow, general, strong, weak), Agents and Environments, Structure of Agents, intelligent agents (simple reflex, model-based, goal-based, utility-based), PEAS representation	
Unit II: PROBLEM FORMULATION AND SEARCH TECHNIQUES	**[9 Hrs]**
Problem formulation, state space representation, production systems, problem characteristics, uninformed search (BFS, DFS, uniform cost search), informed search (heuristic function, best-first search, A* search, Hill Climbing), Constraint Satisfaction problem	
Unit III: MACHINE LEARNING – INTRODUCTION	**[9 Hrs]**
Introduction to machine learning, types of ML (supervised, unsupervised, reinforcement), ML workflow, data collection and preprocessing, handling missing values, normalization and standardization, feature selection and feature engineering, train-test split, cross-validation, evaluation metrics (accuracy, precision, recall, F1-score)	
Unit IV: SUPERVISED LEARNING – REGRESSION	**[9 Hrs]**
Linear Regression, multi linear regression, Polynomial Regression, logistic regression, Non-linear Regression, Model evaluation methods. Classification: – support vector machines (SVM),Naïve Bayes classification	
Unit V: UNSUPERVISED LEARNING	**[9 Hrs]**
Introduction to unsupervised learning, clustering (K-means, hierarchical), dimensionality reduction (PCA), association rule mining (Apriori algorithm), Ensemble learning, Bagging, randomization, Boosting, Applications of Machine learning.	

TEXT BOOKS

S. No.	Title	Authors	Edition	Publisher
1	Artificial Intelligence: A Modern Approach	Stuart Russell, Peter Norvig	III	Pearson
2	Machine Learning	Tom M. Mitchell	I	McGraw-Hill
3	Introduction to Machine Learning	Ethem Alpaydin	III	MIT Press

REFERENCE BOOKS

S. No.	Title	Authors	Edition	Publisher
1	Pattern Recognition and Machine Learning	Christopher M. Bishop	I	Springer
2	Hands-On Machine Learning with Scikit-Learn	Aurélien Géron	---	O'Reilly

		July 2025	NEP 1.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23II601P	Artificial Intelligence & Machine Learning Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. Study about uninformed and Heuristic search techniques 2. Learn techniques for reasoning under uncertainty 3. Introduce Machine Learning and supervised learning algorithms 4. Study about ensembling and unsupervised learning algorithms 5. Study about clustering algorithms	**Students will be able to** 1. Use appropriate search algorithms for problem solving 2. Apply reasoning under uncertainty 3. Build supervised learning models 4. Build ensembling and unsupervised models

Expt. No.	Title of the experiment
1(A)	Implementation of uninformed search algorithms (BFS)
1(B)	Implementation of Depth First Search for Water Jug problem.
2(A)	Implementation of informed search algorithms (A*)
2(B)	Implementation of informed search algorithms (memory- bounded AO*)
3	Implementation of navie bayes classifier algorithm
4	Implement bayesian networks
5(A)	Write a Python program to implement Simple Linear Regression and plot the graph.
5(B)	Implementation of Logistic Regression for iris using sklearn
6(A)	Build decision tree
6(B)	Build random forests tree
7	Implementation of SVM classification.
8	Implement ensembling techniques
9	Implement clustering algorithms
10	Implement em for bayesian networks

Text Books

S.N	Title	Authors	Edition	Publisher
1	*Python Machine Learning*	Sebastian Raschka, Vahid Mirjalili	3rd Edition	Packt Publishing
2	Machine Learning	Tom M. Mitchell	1st Edition	McGraw-Hill

		July 2025	NEP 1.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24

INDUSTRIAL IoT

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
23II602T	Foundations of Data Science	3	-	-	3	MSE	CA	ESE	Total
						15	15	70	100

Course Objectives	Course Outcomes
This course aims to provide students with introductory knowledge of several data science techniques that can be used for data analysis	1. Demonstrate Basic Data Science Concepts 2. Apply Pre-Processing Techniques On Collected Data 3. Perform Analysis Of Data 4. Develop Data Model 5. Evaluate The Data Model

Unit I **[7 Hrs]**

Introduction: Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit II **[9 Hrs]**

Data Collection and Data Pre-Processing: Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

Unit III **[9 Hrs]**

Exploratory Data Analytics: Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots –Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Unit IV **[8 Hrs]**

Building and evaluation of models for: Association analysis, Recommendation systems, Time Series Data and Text Analysis,
Measures for In-sample Evaluation – Prediction and Decision Making.

Unit V **[7 Hrs]**

Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Testing Multiple Parameters by using Grid Search.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Smarter Decisions : The Intersection of IoT and Data Science	Jojo Moolayil		PACKT
2	Doing Data Science	Cathy O'Neil, Rachel Schutt		O'Reilly
3	Data Science and Big data Analytics	David Dietrich, Barry Heller, Beibei Yang		EMC 2013
4	Handbook of Research on Cloud Infrastructures for Big Data Analytics	Raj, Pethuru		IGI Global
5	The Data Science Design Manual	Skiena, Steven S		CRC press

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Practical Data Science with R	Nina Zumel, John Mount.		Manning
2	Data Science for business	F. Provost, T Fawcett		

		July 2025	NEP 1.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23II602P	Foundations of Data Science Lab	---	---	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. Master the use of the R and RStudio interactive environment 2. Explore and understand how to use the R documentation 3. Explore different data types and data structures in R language 4. Understand how to create and manipulate data in R language	**Students will be able to** 1. explore different R language constructs 2. install RStudio and will use it for writing R- programs 3. perform R documentation 4. create and manipulate data in R language

Expt. No.	Title of the experiment
1	Study of basic Syntax's in R and data analysis using MS-Excel
2	Implement of vector data objects operations using R Programming
3	Study and Implement matrix, array and factors in R Programming
4	Write a R program to create a list containing strings, numbers, vectors and a logical values
5	Implement and use data frames in R Programming
6	Create Sample (Dummy) Data in R and perform data manipulation with R
7	Write a R program to extract first two rows from a given data frame
8	Write a R program to sort a given data frame by multiple column(s).
9	Write a R program to select some random rows from a given data frame
10	Write a R program to create a vector of a specified type and length. Create vector of numeric, complex, logical and character types of length 6
11	Write a R program to find Sum, Mean and Product of a Vector.
12	study and implementation of various control structures in R

Text Books

S.N	Title	Authors	Edition	Publisher
1	R for Data Science	Hadley Wickham and Ganett Gorlemund	1st Edition	O'Reilly
2	The Art of R Programming-A Tour of Statistical Software Design	Norman Matlott	1st Edition	No Starch Press

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23II603T	Industrial Automation	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
1. To impart fundamental knowledge of automation, industrial robotics, and their applications in manufacturing. 2. To introduce Programmable Logic Controllers (PLCs) and Supervisory Control and Data Acquisition (SCADA) systems for industrial automation. 3. To develop skills in PLC programming and its implementation in real-world automation applications.	1 Understand the fundamentals of automation, its types, and its role in modern manufacturing systems. 2 Demonstrate knowledge of industrial robots, their specifications, components, and applications in automation. 3 Interpret the architecture, working principles, and selection criteria of PLCs used in industrial applications. 4 Develop PLC programs using ladder logic, timers, counters, and apply them to industrial automation scenarios. 5 Analyze SCADA systems, their architecture, features, and applications in real-world industrial monitoring and control.

Unit I	**[08 Hrs]**
Automation- Definition, types, reasons for automating, arguments for and against automation. Types of production, functions in manufacturing. Automated Flow 'Lines- Methods of work part transport, Transfer mechanisms, Buffer storage. Automated Assembly Systems- Types, parts delivery system	
Unit II	**[09 Hrs]**
Industrial Robotics- Introduction, robot anatomy, robot control systems, Accuracy and repeatability and other specifications, End effectors, sensors, Introduction to robot programming methods, safety monitoring. Robot application.	
Unit III	**[08 Hrs]**
Introduction to PLC: Evolution of PLC, Architecture-PLC Block diagram and working, Selection of PLC, types of PLC, advantages, limitations and applications of PLCs, Networking of PLCs, PLC Hardware- Input and output modules for PLC- working, description, wiring details, specifications, interfacing, types of sensors and actuators	
Unit IV	**[07 Hrs]**
PLc Programming and applications: Programming languages for PLC, G-code and M-code, Ladder programming, relay type instructions – timer, counter, data handling instructions PLC based applications.	
Unit V	**[08 Hrs]**
Introduction to SCADA: Application area of SCADA, Architecture-Elements, block diagram of SCADA, types of SCADA, features of SCADA, MTU, RTU functions, and applications of SCADA.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Automation, production System & CIMS	M P, Groover	Third edition	PHI Prentice Hall
2.	Robotics	Deb S.R.	-	McGraw Hill Publications
3.	Programmable logic controllers and industrial automation	Madhuchahanda Mitra, Samarjitsen gupta	-	Penram International publishing India Pvt. Ltd.

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Programmable logic controllers	V R Jahav		Khanna publications

		July 2025	NEP 1.0	Applicable for 2024-25
Chairman - BoS	Dean – Academics	Date of Release	Version	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23II603P	Industrial Automation Lab		-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended	**Students will be able to**
1. This course aims to provide hands-on experience in industrial automation by implementing CNC operations, robotic applications, and sensor-based object detection. 2. Focuses on developing ladder logic programming skills for traffic control, lighting systems, and motor control. 3. Additionally, students will work on real-time automation projects, including conveyor-based material handling and water level monitoring, enhancing their practical understanding of industrial processes.	1. Demonstrate the operation and performance analysis of CNC milling, CNC lathe, and robotic pick-and-place systems. Implement sensor-based automation for object detection, color sorting, and conveyor belt material handling. 2. Develop and execute ladder logic programs for traffic light control, lighting systems, and conditional motor control. 3. Design and implement real-time industrial automation projects, including palletizing and water level monitoring.

Sr. No.	List of Practical's
1	Performance based on pick and place using Dobot magician robot
2	Performance based on to detect objects in front of the photoelectric switch (Proximity Sensor).
3	Performance based on to categorize red, blue and green objects using color sensor.
4	Performance based on mini conveyor belt for material handling.
5	Performance based on palletizing cubical box.
6	Performance based on CNC milling machine
7	Performance based on CNC lathe machine
8	Write a ladder logic program for traffic light signal control
9	Write a ladder logic program for blinker light for single and double
10	Write a ladder logic program for staircase lighting using 2 way switch
11	Water level indication and pump control
12	Conditional control for two motors

Text books and Reference books

S.N	Title	Authors	Edition	Publisher
1.	Automation, production System & CIMS	M P, Groover	Third edition	PHI Prentice Hall
2.	Robotics	Deb S.R.	-	McGraw Hill Publications
3.	Programmable logic controllers and industrial automation	Madhuchahanda Mitra, Samarjitsen gupta	-	Penram International publishing India Pvt. Ltd.

		July 2025	NEP 1.0	Applicable for 2024-25
Chairman - BoS	Dean – Academics	Date of Release	Version	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23II604T(i)	Control Systems	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
1. To introduce different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified 2. To employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions 3. Formulate different types of analysis in frequency domain to explain the nature of stability of the system.	**Students will be able to** 1. Classify control systems and represent in various models 2. Apply standard test signals to a system to determine their characteristics 3. Make use of stability concepts to obtain the desired characteristics 4. Determine the characteristics of a linear control system using root locus 5. Determine the characteristics of a linear control system in frequency domain

Unit I: Introduction	**[08 Hrs]**
Concepts of control systems. Examples of control systems, classification of control systems, Block diagram algebra, Representation by Signal flow graph. Reduction using Mason's gain formula. Feedback Characteristics, Effects of feedback. Mathematical modelling of systems – Electrical, mechanical translational and rotational systems.	
Unit II : Time domain analysis	**[08 Hrs]**
Time response of system, first order and second order system, standard inputs, concept of gain and time constant. Steady state error, type of control system, approximates methods for higher order system.	
Unit III : Stability of control system	**[08 Hrs]**
Stability of control systems, condition of stability, characteristics equation, Routh Hurwitz criterion, special cases for determining relative stability.	
Unit IV : Stability Analysis in S-Domain	**[08 Hrs]**
Construction of Root locus. Effects of adding poles and zeros to open loop transfer function on the root loci.	
Unit V : Frequency response analysis	**[08 Hrs]**
Correlation between time and frequency responses. Determination of frequency domain specifications, Gain margin and Phase margin -Stability Analysis from Bode Plots and Polar plots.	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Automatic Control Systems	B.K. Kuo	First Edition	PHI
2	Control Systems Engineering	M. Gopal	2008	TMH ,

Reference Books

T. N.	Title	Authors	Edition	Publisher
1	Modern Control Engineering	Ogata	2011	Prentice Hall of India
2	Control Systems Engineering	Nise	3rd Edition 2000	John Wiley

		July 2025	NEP 1.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
23AS601T	Economics and Management	2	-	-	2	MSE	CA	ESE	Total
						7.5	7.5	35	50

Course Objectives	Course Outcomes
1. The course examines how the economics, business and industrial management practices are related and how business decision is taken.	1. Apply economic principles for business decisions by understanding production cost relationships 2. Assess impact of macroeconomics and government policies on business and economy. 3. Recognize key management, marketing, financial and HRM functions and their role in effective business decision-making

Unit I	**[10Hrs]**
Economics, Classification of economics, Industrial economics, Consumer demand, Law of Demand, Determinants of demand, Demand forecasting, Law of supply, Types of Elasticity of demand, Concept of Production, Factors of Production, types of cost, cost curves,	
Unit II	**[10Hrs]**
Market Structures-Perfect competition, Monopoly, and Monopolistic competition, Functions of central bank, Inflation, Deflation, Recession, National income, GDP, GNP, Liberalization, Privatization and Globalization	
Unit III	**[10Hrs]**
Definition of management, functions of management, Functions of human resources Management, Marketing Management, Functions of Marketing Management. Methods of pricing, advertising and sales promotion. Financial Management, functions of financial management, Sources of finance.	

Text Books

S. N	Title	Authors	Edition	Publisher
1.	Managerial Economics	D.N. Dwivedi	8th	Vikas Publishing
2.	Modern Economic Theory	K.K. Dewett	2005	S. Chand Publisher
3.	Industrial Management	Dr.I.K. Chopde, Dr.A.M. Sheikh	Revised edition	S. Chand Publisher

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Industrial Organization and Industrial economics	T.R. Banga, S.C. Sharma	2006	Khanna Publishers

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
23II661O(ii)	OE – III Robotics	3	-	-	3	MSE	CA	ESE	Total
						15	15	70	100

Course Objectives	Course Outcomes
This course is intended To explore the evolution and principles of robotics, classify robotic systems, analyze resolution and dexterity, select robots based on usage, examine grippers and sensors including types and design guidelines, discuss robot cell layout programming methods and languages, and consider socio-economic impacts, safety standards, and AI integration.	**Student will be able to** 1. Interpret terminologies related to Robotics technology. 2. Understand various grippers and sensors for robotics. 3. Apply logic for selection of robotic systems, cell layout and its programing. 4. Integrate knowledge of AI techniques in the area of robotic technology.

Unit I	**[7 Hrs]**
Introduction to robotics: Brief History, Basic Concepts of Robotics such as Definition , Elements of Robotic Systems i.e. Robot anatomy, DOF, etc., Classification of Robotic systems such as work volume, typeS of drive, Associated parameters i.e., accuracy, repeatability. Introduction to Principles & Strategies of Automation, Types & Levels of Automations, Need of automation, Industrial applications of robot.	
Unit II	**[9 Hrs]**
Grippers and Sensors for Robotics: Grippers for Robotics - Types of Grippers and applications. Sensors for Robots - Types of Sensors used in Robotics, Classification and applications of sensors, Characteristics of sensing devices, Selections of sensors. Need for sensors and vision system in the working and control of a robot.	
Unit III	**[9 Hrs]**
Drives and Control for Robotics: Drive - Types of Drives, Types of transmission systems, Actuators and its selection while designing a robot system. Control Systems: Types of Controllers, Introduction to closed loop control.	
Unit IV	**[8 Hrs]**
Robot Cell layouts and Languages for Robotics: Robot Cell layouts, multiple robots and machine interface, other considerations in work cell design. Robot Programming: Methods of robot programming, Programming Languages: Generations of Robotic Languages, Introduction to various types such as VAL, RAIL, AML, ROS	
Unit V	**[7 Hrs]**
Economical trends & Future aspects in Robotics: Socio-Economic aspect of robotisation. Economical aspects for robot design, Safety for robot and standards, Introduction to Artificial Intelligence, AI techniques, Need and application of AI, New trends & recent updates in robotics.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Industrial Robotics	Groover.M.P.	1996.	McGraw – Hill International edition
2.	Introduction to Robotics	S. K. Saha	2014	TATA McGraw Hills Education
3.	Robotics and Control	R. K. Mittal, I. J. Nagrath	2003	TATA McGraw Hill Publishing Co Ltd

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Robotics Technology and Flexible Automation	Deb S R	1994	Tata McGraw Hill, New Delhi,
2.	Fundamentals of Robotics	Dilip Kumar Pratihar,	2019	Narosa Publishing House

		July 2025	NEP 1.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23II605P	Project - I	-	-	2	1	50	50	100

Course Objectives	Course Outcomes
1. To introduce the types of projects and make the learner familiar with the project methodology. 2. To explain the process of literature review and enable students to write problem statements and set objectives to achieve solution of the problem. 3. To enable students to develop the skill of effective oral and writing communication, collaborative and team work.	**Student will be able to:** 1. Develop self-learning ability by searching and organizing information and literature related to project work. 2. Exhibit the skill to communicate effectively in both written and oral form. 3. Acquire collaborative skill and interpersonal relationship by working in a group.

Module 1 : Introduction to Project its Planning and management
- Introduction to types of academic projects
- Overview of project management principles
- Project scope, objectives and constraints
- Work break down structure
- Project scheduling

Module 2 : Literature Review
- Introduction to types of literature and their sources
- Literature management
- Methodology to Conduct a thorough literature review related to the chosen project area
- Identify existing solutions and research gaps
- Compiling findings of literature review

Module 3: Problem Definition and Objective Setting
- Clearly define the project problem and objectives
- Set measurable goals for the project

Module 4: Conceptual Design / research area /
- Preliminary Design
- Generate initial design concepts
- Select the most viable design based on evaluation criteria

Module 5: Oral communication & Technical writing
- Effective oral presentation to convey findings of preliminary project work
- Writing initial part of project thesis

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Research Methodology: Methods and Techniques	Kothari C..R.	2nd Revised Edition, 2004	New Age International Pvt Ltd
2	Design and Analysis of Experiments	Douglas C. Montgomery	9th Edition , 2017	John Wiley & Sons

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Research Methodology: A Step-by-Step Guide for Beginners	Ranjit Kumar	5th Edition , 2022	SAGE Publications
2.	Statistics for Experimenters: Design, Innovation, and Discovery	Paul D. Berger	2nd Edition ,2016	CRC Press

		July 2025	NEP 1.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23II641P	Career Development – VI	-	-	2	1	50	-	50

Course Objectives	Course Outcomes
1. The sole objective of imparting aptitude training is to make students able to critically evaluate various real-life situations by resorting to an analysis of key issues and factors. 2. This Aptitude Training helps them to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions. 3. To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.	1. Students shall solve real life problems comparison of various probabilities, Permutation and combinations to ascertain the best outcomes expected 2. Students shall draw conclusions or Understand geometrical terminology for angles, triangles, quadrilaterals and circles with the help of formulas. 3. The ability to analyze and interpret different forms of data, including tables, graphs, charts, and more. 4. Enable students to critically analyze material (information) to order to evaluate evidence, construct reasoned arguments, and communicate inferences and conclusions. 5. The ability to analyses visual information and solve problems based on visual reasoning.

Unit I	**[6Hrs]**
Aptitude:- Permutation and Combinations:- Letter Arrangement, Number Arrangement, miscellaneous questions Probability:- Color balls, Dice Problems, coins Problems, Playing Cards Problem, Miscellaneous Imax:- Learn Start-up, True Entrepreneurship,	
Unit II	**[6Hrs]**
Aptitude: - Mensuration: - 2-Dimension Problems, 3-Dimension Problems, Area, Volume, Surface Area, Total Surface Area. Geometry: - Lines, Circle, Triangles Etc. Imax:- Personal Accountability, Innovation Lessons from our Ancestors	
Unit III	**[6Hrs]**
Aptitude:- Data Interpretation:- Tabular DI Bar Graph Line graph Pie Char	
Unit IV	**[6Hrs]**
Aptitude:- Logical Thinking (Syllogism) and Venn Diagram problem:- Some, No, All, Some Not, Very Few, Few, Possibility Problem Imax:- Interview Practice 1, Interview Practice 2, Interview Practice 3	
Unit V	**[6Hrs]**
Aptitude:- Non Verbal Reasoning:- Mirror Images, Water Images, Paper Cutting, Paper Folding, Fig Embedded Imax:- Interview Practice 4, Interview Practice 5, Interview Practice 6	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude By R. S. Aggarwal	R.S. Aggarwal		
2	Quantitative Aptitude	Shripad Deo		Allied Publication
3	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Aggarwal		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude for CAT by Arun Sharma	Arun Sharma		

		July 2025	NEP 1.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
23II631M	MDM – IV IoT Connectivity and Communication Protocols	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
To impart a comprehensive understanding and knowledge of the different IoT communication and connectivity technologies along with the interoperability of IoT systems	1. Understand the basic principles involved in IoT systems 2. Understand and gain comprehensive understanding of different IoT Networking and Addressing issues 3. Understand and gain comprehensive understanding of different IoT Connectivity Technologies 4. Understand and gain comprehensive understanding of different IoT Communication Technologies 5. Analyze and gain an in-depth understanding of the issues related to IoT interoperability

Unit I: Emergence of IoT and Architecture **[09 Hrs]**

Introduction and Evolution of IoT, Definition and characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Levels and Deployment Templates, IoT and M2M: differences, SDN and NFV for IoT, Enabling IoT and the Complex Interdependence of Technologies.

Unit II: IoT Networking and Addressing **[09 Hrs]**

IoT Networking Components, Addressing Strategies in IoT, IoT Processing Topologies and Types, Data Format and Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.

Unit III: IoT Connectivity Technologies **[10 Hrs]**

IoT Connectivity Technologies: Introduction, IEEE 802.15.4, Zigbee, Wireless HART, RFID, NFC, DASH7, Z-Wave, Weightless, Wi-Fi, Bluetooth.

Unit IV: IoT Communication Protocols **[10 Hrs]**

Introduction, Infrastructure Protocols: LOADng, RPL, Micro Internet Protocol (uIP), Nano Internet Protocol (nanoIP). Data Protocols: MQTT, CoAP, AMQP, Identification Protocols: EPC, URIs.

Unit V: IoT Interoperability and Standards **[07 Hrs]**

Introduction to Interoperability in IoT, Taxonomy of interoperability: Type and Levels, Importance of Interoperability for IoT Ecosystems, Overview of Key IoT Standards and Protocols: DLNA (Digital Living Network Alliance), KNX (Konnex) Standard for Home and Building Automation

S.No	Title	Authors	Edition	Publisher
1.	Introduction to IoT	Sudip Misra, Anandrup Mukherjee, Arijit Roy	1st edition	Cambridge University Press
2.	Internet of Things	Jeeva Jose	1st edition	Khana Publishers
3.	Internet of Things– A Hands-on Approach	Arshdeep Bahga, Vijay Madisetti,	_	Universities Press, 2015.