





## **KINEMATICS AND DYNAMICS OF ROBOT**

<b>Course Code:</b>	466001
<b>Course Title</b>	Kinematics and Dynamics of Robot
<b>No. of Credits</b>	8 (TH:8,T:0,P:0)

**COURSE OUTCOMES:** At the end of the course, the student will be able to:

1. Understand the fundamental principles of robotics and their applications.
2. Analyze and solve kinematic problems of robotic manipulators.
3. Apply the DH convention and homogeneous transformations for kinematic modeling.
4. Derive and analyze the dynamic equations of robotic systems.
5. Plan and generate trajectories for robot motion.
6. Understand control systems for robot manipulators and mobile robots.

## **COURSE CONTENTS**

### **Unit - 1: Introduction to Robotics**

- 1.1 Definition and Scope of Robotics
- 1.2 Robotic Systems and Applications
- 1.3 Classification of Robots
- 1.4 Degrees of Freedom and Configurations
- 1.5 Robot Anatomy: Links, Joints, and End Effectors
- 1.6 Robot Coordinate Systems

### **Unit - 2: Robot Kinematics**

- 2.1 Forward Kinematics
- 2.2 Inverse Kinematics

### **Unit - 3 : Robot Dynamics**

- 3.1 Introduction to Robot Dynamics
- 3.2 Brief description of various Dynamic Methods

### **Unit - 4 : Trajectory Planning and Control**

- 4.1 Motion Planning and Task Specifications
- 4.2 Velocity and Acceleration Profiles
- 4.3 Trajectory Generation Techniques
- 4.4 Feedback Control Systems

### **Unit - 5 : Workspace Analysis and Manipulability**

- 5.1 Workspace Analysis and Visualization
- 5.2 Manipulability Measures

### **Unit - 6 : Dynamics & Control of Wheeled Mobile Robots**

- 6.1 Kinematics and Dynamics of Wheeled Robots
- 6.2 Trajectory Tracking and Control
- 6.3 Obstacle Avoidance and Path Planning

**Suggested Books:**

1. "Introduction to Robotics: Mechanics and Control" by John J. Craig.
2. "Robot Modeling and Control" by Mark W. Spong, Seth Hutchinson, and M. Vidyasagar.
3. "Robotics: Modelling, Planning and Control" by Bruno Siciliano and Lorenzo Sciavicco.
4. "Robot Dynamics and Control" by Mark W. Spong and M. Vidyasagar.
5. "Modern Robotics: Mechanics, Planning, and Control" by Kevin M. Lynch and Frank C. Park.

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<p align="center"><b>‘Open Elective 1-1’</b>  <b>MODELING &amp; SIMULATION USING MATLAB</b></p>
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<b>Course Code:</b>	466002
<b>Course Title</b>	Modeling & Simulation Using Matlab
<b>No. of Credits</b>	8 (TH:6,T:0,P:4)

**COURSE OUTCOMES:** At the end of the course, the student will be able to:

1. Understand the fundamentals and an overview of high-level programming languages.
2. Familiarize with the MATLAB environment and became Proficient in performing relational and logical operations.
3. Develop proficiency in plotting 2D and 3D graphs in MATLAB and apply it to solve linear systems of equations, curve fitting, and interpolation.
4. Learn the basics of programming in MATLAB, including M-files, user input/output, script-files, and function-files. Gain expertise in control flow constructs like for loops, while loops, if-else-end, switch-case, and try-catch blocks.
5. Acquire knowledge of MATLAB functions, function construction rules, input and output arguments, function handles, anonymous functions, nested functions, and overloaded functions.
6. Understand the concepts of modeling and simulation using MATLAB/Simulink, including creating models using blocks and signals, running simulations, and analyzing results. Gain hands-on experience in modeling and simulating dynamic systems.

## **COURSE CONTENTS**

### **PART – A**

#### **1. Computer Programming**

- 1.1 Introduction to Computer Programming
- 1.2 Algorithm and Pseudo-code
- 1.3 Compilers and Interpreters
- 1.4 Overview of High-Level Programming Languages

#### **2. Introduction to MATLAB**

- 2.1 MATLAB Environment
- 2.2 Scalar and Vector Data types
- 2.3 Matrix manipulation
- 2.4 Saving and Retrieving Data using MAT-Files
- 2.5 Cell Arrays and Structures
- 2.6 Character Strings
- 2.7 Relational and Logical Operations
- 2.8 Plotting 2D and 3D graphs
- 2.9 Applications – Solving linear systems of equations,  
Curve fitting and Interpolation

#### **3. Programming using MATLAB**

- 3.1 Introduction – M-Files, User Input/output, Script-Files  
and Function-Files
- 3.2 Control Flow – For Loops, While Loops, If-Else-End  
Constructs, Switch- Case Constructs, Try - Catch  
Blocks

3.3 Functions – Function Construction Rules, Input and Output Arguments, Scope of Variables, Function Handles, Anonymous Functions, Nested Functions, Private Functions, Overloaded Functions

3.4 Exchanging Data with MAT-Files

3.5 Low level File I/O

## **PART – B**

### **4. Modelling and Simulation using MATLAB/Simulink**

4.1 Introduction to Graphical Programming

4.2 Simulink Basics

4.3 Creating Models using Blocks and Signals

4.4 Running Simulations and Analyzing Results

4.5 Modelling and Simulating Dynamic Systems



**PRACTICAL OUTCOMES:** Upon successful completion of the course, the student will be able to:

1. Construct mathematical models for various real-world systems.
2. Implement models using MATLAB and other simulation techniques.
3. Analyze the behavior of simulated systems and draw meaningful conclusions.
4. Develop problem-solving skills through the application of modelling and simulation.
5. Apply MATLAB programming to other engineering and scientific tasks.

**List of Practicals:**

**1. Introduction to Modeling and Simulation:**

Practical Exercise: Choose a real-world scenario (e.g., traffic flow, customer service, or disease spread) and identify the key components to build a simulation model. Describe the advantages and potential applications of the simulation.

**2. Mathematical Modeling:**

Practical Exercise: Formulate a mathematical model to represent the spread of a disease (may be assumed or any online available data may be taken) in a population. Discuss the differences between continuous and discrete models and validate the model with real data.

**3. Introduction to MATLAB:**

Practical Exercise: Write a MATLAB script to calculate the Fibonacci series up to a user-defined number. Implement

basic programming constructs like loops and conditionals to optimize the calculation.

#### **4. Simulation Techniques:**

Practical Exercise: Use discrete-event simulation to model a queueing system, such as a bank or a service center. Analyze the system's performance by varying different parameters like arrival rate and service rate.

#### **5. Model Implementation in MATLAB:**

Practical Exercise: Develop a MATLAB function to simulate a simple coin toss experiment. Visualize the results using plots to understand the probability distribution of outcomes.

#### **6. Case Studies:**

Practical Exercise: Model and simulate an inventory management system for a retail store. Use Monte Carlo simulation to analyze the impact of demand fluctuations on inventory levels and reordering policies.

## **REFERENCES:**

1. "Modeling and Simulation of Dynamic Systems" by Robert L. Woods and Kent L. Lawrence
2. "MATLAB: A Practical Introduction to Programming and Problem Solving" by Stormy Attaway
3. "Simulation Modeling and Analysis" by Averill M. Law and W. David Kelton
4. "MATLAB for Engineers" by Holly Moore
5. "Introduction to Mathematical Modeling" by Edward A. Bender and Suzanne C. Brenner

## **References/Suggested Learning Resources:**

1. Rudra Pratap, "Getting Started with MATLAB 7", Oxford University Press, 2009
2. Duane Hanselman and Bruce Littlefield, "Mastering MATLAB 7", Pearson Education, 2009
3. S. J. Chapman, "Programming in MATLAB for Engineers", Brooks/Cole Thomson Learning, 2004.
4. Agam Kumar Tyagi, "MATLAB and Simulink for Engineers", Oxford University Press, 2012

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**‘Open Elective 1-2’  
PYTHON PROGRAMMING**

<b>Course Code:</b>	466003
<b>Course Title</b>	Python Programming
<b>No. of Credits</b>	8 (TH:6,T:0,P:4)

**COURSE OUTCOMES :** At the end of the course, the student will be able to:

1. Understand the fundamental concepts of algorithmic problem-solving, including building blocks of algorithms, notation, and simple strategies for developing algorithms (iteration and recursion).
2. Familiarize with data types and expressions in Python, including int, float, Boolean, string, and list. Gain proficiency in variable usage, statements, tuple assignment, and operator precedence.
3. Acquire skills in control flow constructs, such as conditionals (if, if-else, if-elif-else) & iteration (while, for), along with their practical application in problem-solving.
4. Develop knowledge of functions in Python, including function definition, function composition, recursion, and the concept of local and global scope.
5. Learn about data structures like lists, tuples, and dictionaries, and their operations, methods, and parameter usage. Acquire proficiency in list comprehension and advanced list processing.
6. Gain practical experience in file handling, including reading and writing text files, handling exceptions, working with modules and packages, and handling command-line arguments.

## **COURSE CONTENTS**

### **Unit - I : Algorithmic Problem Solving**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

### **Unit - II : Data, Expressions, Statements**

Python interpreter and interactive mode; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

### **Unit - III : Control flow, functions**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

#### **Unit - IV : Lists, Tuples, Dictionaries**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

#### **Unit - V : Files, Modules, Packages**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

**PRACTICAL OUTCOMES:** Upon completion of the course, students will be able to:

1. Write, test, and debug simple Python programs.
2. Implement Python programs with conditionals and loops.
3. Develop Python programs step-wise by defining functions and calling them.
4. Use Python lists, tuples, dictionaries for representing compound data.
5. Read and write data from/to files in Python.

**List of Practicals:**

1. Programs related to basic input/output.
2. Programs related to variables, strings, numbers
3. Programs related to Lists and Tuples
4. Programs related to Functions
5. Programs related to If Statements
6. Programs related to While Loops and Input
7. Programs related to Basic Terminal Apps
8. Programs related to Dictionaries
9. Programs related to Classes
10. Programs related to Exceptions
11. Case study of application areas of python.

### **References/ Suggested Learning Resources:**

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
2. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, “Introduction to Computation and Programming Using Python”, Revised and expanded Edition, MIT Press, 2013
4. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Interdisciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
5. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
6. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.
7. Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem- Solving Focus, Wiley India Edition, 2013.
8. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers, LLC, 2013.

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**‘Open Elective 2-1’  
MATERIAL HANDLING SYSTEMS**

<b>Course Code:</b>	456004
<b>Course Title</b>	Material Handling Systems
<b>No. of Credits</b>	6 (TH:6,T:0,P:0)

**COURSE OUTCOMES :** At the end of the course, the student will be able to:

1. Understand constructional & operational features of various materials handling systems.
2. Identify, compare & select proper material handling equipment for specified applications.
3. Know the controls & safety measures incorporated on material handling equipment.
4. Appreciate the role of material handling devices in mechanization & automation of industrial process.
5. Understand & appreciate safety instrumentation for equipment

## **COURSE CONTENTS**

### **Unit - I : Overview of Material Handling:**

Principles of Material Handling, Principal groups of Material Handling equipment – General Characteristics and application of Material Handling Equipment, modern trends in material handling.

### **Unit - II : Lifting Equipment:**

Hoist Components of Hoist – Load Handling attachments hooks, grabs and clamps – Grabbing attachments for bulk material – Wire ropes and chains.

### **Unit- III : Lifting tackle pulleys for gain of force & speed:**

Tension in drop parts –Drums, Shears and sprockets – Arresting gear and brakes – Block brakes, Band brakes, thrust brakes – Safety and hand cranks. Principle operation of EOT, Gantry and jib cranes Hoisting Mechanisms, Travelling mechanisms, lifting mechanisms – Slewing Mechanisms – Elevators and lifts.

### **Unit - IV : Conveying Machines:**

Belt conveyors, conveyor belts, Passenger conveyor, Bucket flight conveyors, Cradle conveyor, conveyor elevators. Overhead conveyors, Load carrying car conveyors, Screw conveyors, Oscillating conveyor, Roller conveyor, Hydraulic and pneumatic conveyor, Chutes Bins.

### **Unit - V : Current trends in Material Handling:**

Computer Aided Systems for Material Handling.

**Text & Reference Books:**

1. Material handling (Principles & Practice) – Allegri T. H., CBS Publisher, New Delhi.
2. Plant Layout & Materials Handling – Apple J. M., JohnWiley Publishers.
3. Material Handling Equipment – N. Rundenko, Peace Publisher, Moscow.
4. Material Handling Equipment – M. P. Alexandrov, MIR Publisher, Moscow.
5. Material Handling Equipment – Y. I. Oberman, MIR Publisher, Moscow.

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<p align="center"><b>‘Open Elective 2-2’</b>  <b>INDUSTRIAL ENGINEERING &amp; MANAGEMENT</b></p>
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<b>Course Code:</b>	456006
<b>Course Title</b>	Industrial Engineering & Management
<b>No. of Credits</b>	6 (TH:6,T:0,P:0)

**COURSE OUTCOME :** At the end of the course, the student will be able to:

1. Explain the different types of layouts and plant maintenance with safety
2. List and explain the need of method study and work measurements
3. Explain the production planning and quality control, and its functions
4. Understand the basic principles, approaches and functions of management and identify concepts to specific situations
5. List and explain the different financial sources and methods of inventory management

## **COURSE CONTENTS**

### **Unit - 1 : Plant Engineering**

- Selection of site of industry;
- Plant layout, Principles of a good layout, Types of layout, Techniques to improve Layout;
- Process; Product;

### **Unit 2 - Work Study**

- Productivity;
- Standard of living;
- Method of improving Productivity;
- Importance of good working conditions;
- Method Study: Definition, Objectives, Basic procedure;
- Work Measurement: Definition, Basic procedure;
- Numerical Problems;
- Basic concept of production study;

### **Unit - 3 : Production Planning and Control**

- Introduction, Major functions;
- Pre planning;
- Methods of forecasting;
- Routing and Scheduling;
- Dispatching and Controlling;
- Concept of Critical Path Method (CPM);
- Types of Production;
- Economic Batch Quantity (EBQ);
- Principles of Product and Process Planning;
- Make or Buy decision;
- Numerical problems;
- Quality Control: Types of inspection;

#### **Unit - 4 : Principles of Management**

- Definition of Management;
- Administration; Organization;
- Taylor's and Fayol's Principles of Management;
- Functions of Manager;
- Types of Organization
- Leadership: Styles of Leadership, Qualities of a good leader;
- Motivation
- Management Information Systems;
- Personnel Management
- Responsibility of Human Resource Management;
- Selection Procedure;
- Training of Workers;
- Apprentice Training;
- On the Job training (OJT);

**Text & Reference Books:**

1. Industrial Engineering & Management, S.C. Sharma, Khanna Book Publishing Co. (P) Ltd., Delhi.
2. Industrial Engineering and Management, O.P. Khanna, Revised Edition, Dhanpat Rai Publications (P) Ltd., New Delhi – 110002.
3. Management, A global perspective, Heinz Weihrich, Harold Koontz, 10th Edition, McGraw Hill International Edition 1994.
4. Essentials of Management, 4th Edition, Joseph L.Massie, Prentice-Hall of India, New Delhi 2004.
5. Principles and Practices of Management, Premvir Kapoor, Khanna Publishing House, N. Delhi

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**‘Program Elective 1-1’  
CONTROL SYSTEM AND PLC**

<b>Course Code:</b>	456002
<b>Course Title</b>	Control System and PLC
<b>No. of Credits</b>	6 (TH:6,T:0,P:0)

**COURSE OUTCOMES :-** At the end of the course, the student will be able to:

1. Identify different types of automation systems.
2. Interface I/O devices with the PLC modules.
3. Develop PLC ladder programs for various real life applications.



## **COURSE CONTENTS**

### **Unit : 1 - Basics of Control System**

1. Basics of control system diagram and practical examples;
2. Classification of control systems;
3. Open loop and closed loop systems;
4. Linear and non-linear systems;
5. Transfer function.
6. Standard test inputs: Step, Ramp, Parabolic, Impulse;

### **Unit : 2 - Process Controllers**

1. Process control system: block diagram, functions of each block;
2. Control actions: discontinuous mode, continuous mode;
3. Composite controllers: PI, PD, PID controllers- output equation, response.

### **Unit : 3 - Fundamentals of PLC**

1. Building blocks of PLC.
2. PLC types.
3. I/O module selection criteria.

### **Unit : 4 - PLC Programming and Applications**

1. PLC I/O addressing
2. PLC programming language: Functional Block Diagram (FBD), Instruction List. Ladder Programming.
3. PLC programming Instructions and ladder: Relay type instructions, Timer instructions: On delay, off delay,

retentive, Non-retentive; Counter instructions: Up, Down, Logical instructions, Comparison Instructions, Data handling Instructions, Arithmetic instructions.

#### 4. Study of PLC Based Industrial Applications

#### **References / Suggested Learning Resources:**

1. Modern control engineering Ogata K. PHI 5th edition New Delhi
2. Programmable Logic Controllers Petruzella F.D. TMH 3rd edition New Delhi

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**‘Program Elective 1-2’  
MECHATRONICS**

<b>Course Code:</b>	466004
<b>Course Title</b>	Mechatronics
<b>No. of Credits</b>	6 (TH:6,T:0,P:0)

**COURSE OUTCOMES :** At the end of the course, the student will be able to:

1. Develop a comprehensive understanding of Mechatronics and its role in various systems.
2. Analyze and select appropriate sensors for different measurement and control systems.
3. Apply mathematical modeling techniques to build models for mechanical, electrical, fluid, and thermal systems.
4. Demonstrate proficiency in programming and using PLCs for automation and control applications.
5. Apply Mechatronics principles in solving practical design challenges and case studies.
6. Explore advanced applications of Mechatronics in condition monitoring and automated manufacturing.

## **COURSE CONTENTS**

### **Unit - I : Introduction to Mechatronics**

- Significance and applications of Mechatronics.
- Different types of measurement and control systems.
- Basic functioning of closed-loop control systems.
- Working principles of various sensors used in Mechatronics.

### **Unit - II : Mechanical Actuation Systems**

- Difference between various types of mechanical actuation systems.
- Understand gear trains, pawl and ratchet mechanisms, and belt and chain drives.
- Basics of bearings selection and their importance in mechanical systems.
- Electrical actuation systems, including switches, relays, DC and AC motors, stepper motors, and servomotors.
- Explore pneumatic and hydraulic systems.

### **Unit-III: Design Examples & Advanced Applications in Mechatronics**

- Apply the design process stages in Mechatronics systems.
- Study of pick-and-place robots, car park barriers and washing machines.
- Sensors used for condition monitoring systems in production processes.
- Study of Mechatronic control in automated manufacturing.

**Reference Books:**

1. Mechatronics – W. Bolton, Pearson Education India.
2. A Text Book on Mechatronics – R.K.Rajput, S.Chand & Co, New Delhi.
3. Mechatronics – M.D.Singh & Joshi, Prentice Hall of India.
4. Mechatronics – HMT, Tata McGraw Hill, New Delhi.
5. Mechatronics System – Devadas Shetty, PWS Publishing
6. Exploring Programmable Logic Controllers with applications – Pradeep Kumar Srivatsava, BPB Publications.

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**‘AUDIT COURSE’  
INDIAN CONSTITUTION**

<b>Course Code:</b>	AS601
<b>Course Title</b>	Indian Constitution (Audit Course)
<b>No. of Credits</b>	0 (TH:2,T:0,P:0)

**COURSE OUTCOMES:** After completion of the course the students are able to:

1. Understand the historical background and significance of the Indian Constitution, including the process of its making and the principles enshrined in it.
2. Analyze and interpret key elements of the Constitution.
3. Describe the structure and functioning of the Union Government.
4. Explain the roles and powers of the State Government.
5. Examine the structure and responsibilities of local administration, such as District Administration, Municipal Corporations, and Zila Panchayats.
6. Understand the role and functioning of the Election Commission.

## **COURSE CONTENTS**

### **1. The Constitution :**

- 1.1 Introduction
- 1.2 The History of the Making of the Indian Constitution
- 1.3 Preamble & the Basic Structure.
- 1.4 Fundamental Rights & Duties.
- 1.5 Directive Principles of State Policy (DPSP).

### **2. Union Government :**

- 2.1 Structure of the Indian Union
- 2.2 President– Role and Power
- 2.3 Prime Minister and Council of Ministers
- 2.4 Lok Sabha and Rajya Sabha

### **3. State Government :**

- 3.1 Governor– Role and Power
- 3.2 Chief Minister and Council of Ministers

### **4. Local Administration :**

- 4.1 District Administration
- 4.2 Municipal Corporation
- 4.3 Zila Panchayat

### **5. Election Commission :**

- 5.1 Composition, Role and Functioning of:
  - 5.1.1 Chief Election Commission
  - 5.1.2 State Election Commission

**Suggested Learning Resources :**

1. Ethics and Politics of the Indian Constitution, Rajeev Bhargava, Oxford University Press, New Delhi,
2. The Constitution of India, B.L. Fadia, Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India, D.D. Basu, Lexis Nexis; Twenty-Third 2018 edition

**Suggested Software / Learning Websites :**

1. <https://www.constitution.org/cons/india/const.html>
2. <http://www.legislative.gov.in/constitution-of-india>
3. <https://www.sci.gov.in/constitution>
4. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>

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## **ENTREPRENEURSHIP AND START-UPS** **(Common in all branches of Engineering)**

<b>Course Code:</b>	AS602
<b>Course Title</b>	Entrepreneurship and Start-ups
<b>No. of Credits</b>	4 (TH:4,T:0,P:0)

**COURSE OUTCOMES:** At the end of the course, the student will be able to:

1. Develop an understanding of the concept of entrepreneurship and its relevance in the engineering field, including the importance of creativity, innovation, and problem-solving.
2. Generate and evaluate entrepreneurial ideas, identifying market opportunities and target customers, and assessing the feasibility of a start-up venture.
3. Create a comprehensive business plan and formulate effective strategies for a start-up venture, encompassing marketing, operations, finance, and growth.
4. Comprehend the legal and regulatory considerations involved in establishing and operating a business, ensuring compliance and mitigating legal risks.
5. Design and implement marketing and sales strategies to effectively position and promote the start-up, considering market segmentation, branding, and customer acquisition.
6. Apply financial management principles to plan and manage the financial aspects of a start-up, including budgeting, financial forecasting, and resource allocation.

## **COURSE CONTENTS**

### **1. Introduction to Entrepreneurship**

- Concept of entrepreneurship
- Importance of entrepreneurship in the engineering field
- Traits and characteristics of successful entrepreneurs

### **2. Ideation and Opportunity Identification**

- Generating entrepreneurial ideas
- Evaluating market opportunities
- Conducting market research and feasibility analysis
- Identifying target customers and their needs

### **3. Business Planning and Strategy**

- Business objectives and goals
- Need of Business plan
- Formulating business strategies
- Assessing risk and managing uncertainty

### **4. Legal and Regulatory Considerations**

- Legal forms of business entities
- Compliance with regulations and licenses
- Contracts and agreements in entrepreneurship

### **5. Marketing and Sales Strategies**

- Need of marketing plan
- Methods for marketing
- Pricing strategies
- Sales and distribution

## **6. Financial Management for Start-ups**

- Financial planning and budgeting
- Funding sources and raising capital

## **7. Operations and Supply Chain Management**

- Designing efficient operations processes
- Supply chain management for start-ups
- Quality management and control
- Logistics and inventory management

## **8. Human Resource Management**

- Leadership and organizational culture
- Performance management and motivation

## **9. Entrepreneurial Mindset and Growth**

- Nurturing creativity and innovation
- Overcoming challenges and failures

**Reference Books:**

1. "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries
2. "The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company" by Steve Blank and Bob Dorf
3. "Disciplined Entrepreneurship: 24 Steps to a Successful Startup" by Bill Aulet
4. "Zero to One: Notes on Startups, or How to Build the Future" by Peter Thiel and Blake Masters
5. "The Art of Startup Fundraising: Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know" by Alejandro Cremades
6. "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers" by Alexander Osterwalder and Yves Pigneur
7. "Venture Deals: Be Smarter Than Your Lawyer and Venture Capitalist" by Brad Feld and Jason Mendelson
8. "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail" by Clayton M. Christensen
9. "Founders at Work: Stories of Startups' Early Days" by Jessica Livingston.
10. "Start with Why: How Great Leaders Inspire Everyone to Take Action" by Simon Sinek.

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## MAJOR PROJECT-II

<b>Course Code:</b>	AS603
<b>Course Title</b>	Major Project - II
<b>No. of Credits</b>	3 (TH:0,T:0,P:6)

**Introduction :** Major Project-II represents the pinnacle of the diploma program, where students demonstrate their acquired knowledge and skills through the execution of a practical project. This capstone experience focuses on project implementation, problem-solving, data analysis, and effective communication. It challenges students to tackle real-world issues and apply their learning to find innovative solutions. Major Project-II nurtures responsibility, autonomy, and professionalism, preparing students for a successful transition into their future careers.

### **1. Project Execution (20%):**

- Successful implementation of the project plan, adhering to the approved methodology.
- Demonstrating practical skills, technical knowledge, and attention to detail during project execution.

### **2. Regular Monitoring (10%):**

- Providing periodic progress updates to project advisors and faculty mentors, showcasing responsibility and timely communication.
- Ability to adapt and make necessary adjustments to the project timeline as needed.

**3. Data Analysis (15%):**

- Applying appropriate techniques and tools to analyze collected data.
- Deriving meaningful insights and drawing well-supported conclusions.

**4. Problem-Solving (15%):**

- Identifying and addressing challenges and hurdles encountered during project execution.
- Demonstrating innovative thinking and resourcefulness in problem-solving.

**5. Report Writing (15%):**

- Preparing a comprehensive project report with a well-structured and organized presentation of the project journey.
- Clearly explaining the methodology, findings, and conclusions in a coherent manner.

**6. Presentation (15%):**

- Delivering a compelling and engaging project presentation to a panel of faculty members & experts.
- Demonstrating effective communication skills and confidence during the project defense.

**7. Final Evaluation (10%):**

- Punctuality and adherence to project deadlines.
- Demonstrating initiative and taking ownership of the project.
- Overall professionalism and commitment exhibited throughout the project.

**Conclusion:** Major Project-II serves as a significant milestone in the academic journey of diploma students. By incorporating marks distribution, the evaluation becomes more transparent, allowing students to understand the weighting of each aspect. Through project execution, problem-solving, data analysis, and effective communication, students will not only showcase their academic prowess but also their readiness to embrace real-world challenges. This capstone experience equips students with the skills and confidence needed to thrive in their chosen professions, paving the way for a successful and rewarding future.

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## SEMINAR

<b>Course Code:</b>	AS604
<b>Course Title</b>	Seminar
<b>No. of Credits</b>	1 (TH:2,T:0,P:0)

### **Guidelines for Seminar Presentation:**

#### **1. Topic Selection:**

Choose a topic that is relevant to the field of gaming and animation, and that interests both the speaker & the audience. Consider emerging trends, technological advancements, or specific areas of expertise within the industry.

#### **2. Research and Information Gathering:**

Conduct thorough research on your chosen topic to gather relevant information, statistics, case studies, and examples. Utilize reputable sources such as academic journals, industry publications, and credible websites to ensure the accuracy of information gathered.

#### **3. Presentation Structure:**

Organize your seminar presentation into clear sections, including an introduction, main content, and conclusion. Use headings, sub-headings, and bullet points to help the audience follow your presentation easily.

#### **4. Audience Engagement:**

Incorporate interactive elements into your presentation to keep the audience engaged. This may include questions, quizzes, demonstrations, or multimedia components such as videos, images, or animations related to your topic.



## **5. Visual Support:**

Create visually appealing slides to support your presentation. Use a clear and readable font, include relevant visuals, and avoid overcrowding slides with excessive texts. Visuals should be used to enhance understanding and highlight key points.

## **6. Explanation of Technical Concepts:**

If your topic involves technical concepts or terminology, explain them in simple and concise terms. Use analogies or real-life examples to help the audience grasp complex ideas.

## **7. Use of Examples and Case Studies:**

Include real-world examples or case studies to illustrate the application of concepts or technologies in the relevant. This will help the audience connect theory to practice and understand the practical implications of your topic.

## **8. Delivery and Rehearsal:**

Practice your presentation multiple times to ensure a smooth and confident delivery. Time yourself to ensure that your presentation fits within the allotted time. Rehearsing will help you become familiar with the content and enhance your overall presentation skills.

## **9. Q & A and Discussion:**

Reserve time at the end of your presentation for questions and discussion. Encourage the audience to ask questions or share their thoughts. Be prepared to answer questions and engage in meaningful dialogue with audience related to the selected topic.

### **10. Professionalism and Enthusiasm:**

Dress appropriately for the occasion and maintain a confident and professional demeanor throughout your presentation. Maintain eye contact with the audience, speak clearly and audibly, and exhibit enthusiasm for your topic.

**Evaluation Strategy:** The performance of Seminar should be evaluated on the basis of following criteria:

<b>S.N.</b>	<b>Evaluation Parameter</b>	<b>Weightage (%)</b>
1.	Relevance of Topic	10
2.	Content Selection	20
3.	Presentation & Communication Skills	15
4.	Audience Engagement	10
5.	Explanation of Technical Concepts	20
6.	Use of Examples and Case Studies	10
7.	Q&A and Discussion	15
	<b>Total</b>	<b>100</b>

**Remember, seminars are not just about sharing information but also about connecting with the audience and creating a memorable experience. Tailor your seminar presentation to cater to the interests and knowledge level of the audience, and aim to inspire and educate them about the concerned technology or topic.**

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