



# POORNIMA

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## COLLEGE OF ENGINEERING

Approved by AICTE  
Affiliated to Rajasthan Technical University, Kota  
Recognized by UGC under Section 2(f) of the UGC Act, 1956

*1.2.1 Number of Add on/ Certificate/  
value added programs offered during the  
last five years  
(Add-on courses Institute Level  
Brochures- Session 2021-22)*

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# POORNIMA

## COLLEGE OF ENGINEERING

Affiliated to RTU, Kota • Approved by AICTE & UGC under 2(f) • Accredited by NBA



# Brochure of Add-On Courses

SESSION 2021-22





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**LIST OF ADD-ON COURSES OFFERED**

**TERMS AND CONDITIONS FOR ADD-ON COURSE ENROLMENT**

1. One Department Course has to be compulsorily selected by every student in every session.
2. Course enrolment form has to be duly filled and submitted by the declared due date to the Tutor office, failing in which registration will not be accepted.
3. All Courses are free of cost, unless specified explicitly.
4. There is a mandatory attendance criteria for each course as specified in the brochure for achieving the certification.
5. In general a course will be conducted only after receiving a minimum 50 enrolment applications.
6. In case of any conflict or ambiguity the decision taken by the Head of the Department / IQAC will be considered standing and final.
7. In case of any unfair means used in Certification examination by an attendee, the course registration will be immediately cancelled.
8. Certification examination will not be re-conducted in any circumstances.
9. Department may issue additional instructions and criteria for their respective courses.



NAME OF COURSE	COURSE CODE
<b>DEPARTMENT LEVEL COURSES</b>	
<b>DEPARTMENT OF CIVIL ENGINEERING</b>	
<i>Advance Building Construction and Drawing</i>	<i>AOC-DEP-CIV-ABCD</i>
<i>Analysis &amp; Design of Tall Building</i>	<i>AOC-DEP-CIV-ADTB</i>
<i>Building Information Modelling</i>	<i>AOC-DEP-CIV-BIM</i>
<i>Residential House Planning as per NBC</i>	<i>AOC-DEP-CIV-RHPN</i>
<i>Sketch Up 3D Modeling</i>	<i>AOC-DEP-CIV-TDM</i>
<b>DEPARTMENT OF COMPUTER ENGINEERING</b>	
<i>Microsoft Azure Academia Program: Azure AI Fundamentals</i>	<i>AOC-DEP-CSE-AZAI</i>
<i>Microsoft Azure Academia Program: Python Programming</i>	<i>AOC-DEP-CSE-AZPY</i>
<i>Microsoft Azure Academia Program: Microsoft Azure Data Fundamentals</i>	<i>AOC-DEP-CSE-AZDF</i>
<i>Microsoft Azure Academia Program: Big Data</i>	<i>AOC-DEP-CSE-AZBD</i>
<i>Microsoft Azure Academia Program: POWER BI “DATA ANALYTICS”</i>	<i>AOC-DEP-CSE-AZBI</i>
<i>Microsoft Azure Academia Program: Cloud Infrastructure and Security</i>	<i>AOC-DEP-CSE-AZCI</i>
<i>Programming in Hadoop</i>	<i>AOC-DEP-CSE-AZHD</i>
<i>Data Science with Python</i>	<i>AOC-DEP-CSE-DSPY</i>
<i>Selenium Testing</i>	<i>AOC-DEP-CSE-SETS</i>
<b>DEPARTMENT OF ELECTRICAL ENGINEERING</b>	
<i>AUTONOM</i>	<i>AOC-DEP-EE-AUTO</i>
<i>Enabling Technology for Electric Transportation</i>	<i>AOC-DEP-EE-ET</i>
<i>Introduction to MATLAB for Engineering Problems</i>	<i>AOC-DEP-EE-MATL</i>
<i>Understanding Basics of Micro controller and Embedded Systems</i>	<i>AOC-DEP-EE-MCES</i>
<i>Introduction to Virtual Labs</i>	<i>AOC-DEP-EE-VL</i>
<b>DEPARTMENT OF ELECTRONICS &amp; COMMUNICATION ENGINEERING</b>	
<i>Design of Basic Robots</i>	<i>AOC-DEP-ECE-DBR</i>
<i>OptiSystem Fundamentals and Design Techniques</i>	<i>AOC-DEP-ECE-OPTI</i>
<i>Use of AI in Electronics</i>	<i>AOC-DEP-ECE-AI</i>
<i>Python Programming: The basics</i>	<i>AOC-DEP-ECE-PP</i>
<b>DEPARTMENT OF INFORMATION TECHNOLOGY</b>	
<i>Web Design and Development</i>	<i>AOC-DEP-IT-WEB</i>
<i>Advanced Python Programming</i>	<i>AOC-DEP-IT-PYP</i>
<b>DEPARTMENT OF MECHANICAL ENGINEERING</b>	
<i>CATIA</i>	<i>AOC-DEP-ME-CTA</i>
<i>Solid Works</i>	<i>AOC-DEP-ME-SW</i>
<i>3D Printing</i>	<i>AOC-DEP-ME-TDP</i>
<i>Basics of Automobile Engineering</i>	<i>AOC-DEP-ME-BAE</i>
<i>Advances of Automobile Engineering</i>	<i>AOC-DEP-ME-AAE</i>
<b>DEPARTMENT OF FIRST YEAR</b>	
<i>Project Based Learnings</i>	<i>AOC-DEP-FY-PBL</i>
<i>Program on Logical Reasoning and Technical Skill Development</i>	<i>AOC-DEP-FY-LRTS</i>
<i>Skill Development Program in Project Oriented Training</i>	<i>AOC-DEP-FY-SDPP</i>
<i>Skill Development Program in Advanced C</i>	<i>AOC-DEP-FY-ACP</i>
<i>Skill Development Program in Machine Learning-Deep learning</i>	<i>AOC-DEP-FY-SDPML</i>
<i>Skill Development Program in Web Development using JAVASCRIPT and REACTJS</i>	<i>AOC-DEP-FY-SDPWD</i>





# **SECTION - 1**

## **CAMPUS LEVEL COURSES**



# SECTION – 1

## DEPARTMENT LEVEL COURSES



**2.1 DEPARTMENT OF CIVIL ENGINEERING**

S. No.	Course ID	Course Name	No. of Modules	Course Duration	Course Facilitator
1	AOC-DEP-CIV-ABCD	Advance Building Construction and Drawing	10	32 Hours	Mr. Laxmikant Saini
2	AOC-DEP-CIV-ADTB	Analysis & Design of Tall Building	10	30 Hours	Mr. Divya Vishnoi
3	AOC-DEP-CIV-BIM	Building Information Modelling	17	72 Hours	Mr. Prateek Sharma
4	AOC-DEP-CIV-RHPN	Residential House Planning as per NBC	10	30 Hours	Dr. Pooja Gupta
5	AOC-DEP-CIV-TDM	Sketch Up 3D Modeling	10	30 Hours	Dr. Manoj Gattani

**2.1.1 COURSE TITLE: Advance Building Construction and Drawing (COURSE CODE: AOC-DEP-CIV-ABCD)**

1. **COURSE DESCRIPTION:** The Department of Civil Engineering organizes the Advance Building Construction and drawing (ABCD) value added courses to all the students of civil engineering department. Faculty member shall deliver the lectures on demand for understanding and exposure of all parameters of civil engineering. The faculty members have been contributing significantly to the improvement of the quality of Civil Engineering education. The main focus of the ABCD Value aided course will be on providing comprehensive knowledge about fundamental of civil engineering topics relevant to the competition exam and industrial demand of modern world.

**2. COURSE OUTCOMES:**

S. No.	Course Outcomes
CO1	Apply the concept of building material and construction like building bye-laws, mix design, Sustainable building and construction.
CO2	Develop programs using REVIT software, architectural and structural drawing using AUTOCAD Software
CO3	Demonstrate the use of material for quality assurance using NDT Technique, instrumental adjustments technique by surveying
CO4	Design solutions of real-world civil engineering problems using bar bending Schedule, Estimating & Costing

**3. MAPPING COURSE OUTCOMES WITH PO AND PSO**



CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	-	2	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	3	-	-	-	-	-	-	-	2	-

#### 4. COURSE PRE-REQUISITES:

Students learn about recent techniques, case study & innovative outcome based learning to analyze and evaluate the concepts of civil engineering to make his personality competent enough to fulfill the gap between academic and industry.

#### 5. ENROLMENT CRITERIA: Students of Civil Engineering

#### 6. CERTIFICATION CRITERIA: Mandatory Fulfillments of Criteria 1 and 2

Criteria 1: 80% Attendance

Criteria 2: 80% or above marks in Certification Exam

#### 7. WEEK-WISE COURSE OUTLINE:

S. No	Course	Content	Hours	Coordinator
1	<b>Basics of Building Construction</b>	Parts of buildings, Building Bye Laws, Sequence of construction works- Foundation, Walls, Columns, Beams, Floors, and Roofs	3	Mr. Alok Kumar
2	<b>Basics of Building Materials</b>	Introduction to material and its properties and different test performed for material assessment. Introduce sustainable material and construction. Properties of fresh and hard concrete, Mix Design	4	Mr. Balwan
3	<b>Basics of Drawings</b>	Orthographic, Isometric and perspective Projection Drawing: Site plan, index plan, layout plan, plinth area, floor area, General Notes for drawing; Drawings: Architectural, Structural and Plumbing	3	Mr. Arpit Singh Bhadoriya
4	<b>Basics of Surveying</b>	Introduction to Survey, Instruments discussion, Instrument Adjustment, Error and Correction	3	Mr. Prateek Sharma



5	<b>Introduction of Revit</b>	About software, Structural Elements and Families, Dynamo Introduction, Inputs, Lists_ Dynamo Generic Workflow, Points_ Curves_ Surfaces, Create Revit Elements, Revits input and output, Custom Nodes, Creation of Modules, Tridimensional Structure, Framing on Tridimensional Structure, Floor Based Creation, Using Lines to Create a multiple Structure, Setting Modules and Revit Elements	3	Mr. Mayank Gupta
6	<b>Basics of Quality Control and Quality Assurance</b>	Codal Provisions & Importance Of Codes For Ensuring Strength With Serviceability, Ensuring Quality Control And Quality, Assurance Before & After Construction: NDT Techniques	3	Mr. Laxmikant Saini
7	<b>Basics of Estimation</b>	<b>Measurement and Billing:</b> Measurement book, muster roll, piecework agreement and work order Valuation of Real estate; <b>Bar bending Schedule:</b> Bar bending Schedule of Reinforcement in R.C.C. Component by using MS-Excel; <b>Rate Analysis:</b> Rate analysis for earthwork, concrete work, D.P.C., stone masonry, brick masonry, pointing, painting and labours used in different work of Building Construction by using MS-Excel	4	Dr. Manoj Gattani

### 2.1.2 COURSE TITLE: Analysis & Design of Tall Building (COURSE CODE: AOC-DEP-CIV-ADTB)

- COURSE DESCRIPTION:** In this course student will learn about the analysis and design of multi storey RCC building through the technical concepts and industry grade software used in Structural engineering. Student will also learn to prepare detail drawing of various components of building
- COURSE OUTCOMES:**

S. No.	Course Outcomes
CO1	Describe the basic knowledge of tall building used in Architectural design



CO2	Apply the typical concept in analysis for building plan, elevation and section.
CO3	Discuss the bending moment and shear force for beams, columns, slabs and footings.
CO4	Apply the fundamental concept of design philosophies of Reinforced concrete member according to the IS code 456:2000

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO 2	3	-	-	-	-	-	-	-	-	-	-	-	-	1	2
CO 3	2	-	-	-	-	-	-	-	-	-	-	-	1	2	3
CO 4	3	-	-	-	-	-	-	-	-	-	-	-	2	2	3

### 4. COURSE PRE-REQUISITES:

Students learn about recent techniques, case study & innovative outcome based learning to analyze and evaluate the concepts to make his personality competent enough to fulfill the gap between academic and industry.

### 5. ENROLMENT CRITERIA: Interested Students of III Year (Civil Engineering)

### 6. CERTIFICATION CRITERIA: Mandatory Fulfillments of Criteria 1 and 2

Criteria 1: 80% Attendance

Criteria 2: 80% or above marks in Certification Exam

S. No.	WEEK	Module	TOPIC	No. of Hours
1	WEEK-01	Description of fundamental terms of tall building	Introduction about tall building, Project configuration, methods of beam and column; Geometry tools- Add beam, Translational Repeat, Circular Repeat, Insert Node, merge Tool.	3
2	WEEK-02	Description of complex geometry and 3D model	Methods of 3D building, mirror command, Selection tool, view tool, rotation tool, cut section and renumber.	3
3	WEEK-03	Describe the Analysis features.	Apply property, support and load & load calculation for 2D and 3D geometry	3
4	WEEK-04	Description of various load calculation on a structure	Dead Load- Floor load, Floor finish load, Wall load and Live load, wind load, check	3

  
Dr. Mahesh Bunde  
B.E., M.E., Ph.D.

Director

Poonima College of Engineering  
ISO-9001:2015 Institutional Area  
Sitapura, JAIPUR



			Shear force and bending moments.	
5	WEEK-05	RCC Design of a Building	Slab creation, Design beam, Design column, Design output Results, Detail Drawing sheet of beam column & slab	3
6	WEEK-06	Description of earthquake load parameters used for building and shear wall design	Earthquake load, response spectrum leadership definition; Loading Calculation, concept of shear wall & drawing sheet of shear wall design	3
7	WEEK-07	Analysis and design of superstructure and sub structure using vertical & horizontal Load	Study the results of beam, column and slab, create beam drawing, column drawing, slab drawing and footing drawing as per site requirement	3
8	WEEK-08	Structural Drawings	Preparation of structural drawings of beam, Column. Slab, shear wall and foundation.	3
9	WEEK-09	Site Visit	Visit of Tall building-Live Project	3
10	WEEK-10	Project	As per practical data or any live Project	3

### 2.1.3 COURSE TITLE: Building Information Modelling (COURSE CODE: AOC-DEP-CIV-BIM)

1. **COURSE DESCRIPTION:** In this BIM Training Module, We teach you and guide you towards many career opportunities in BIM for civil engineers and architects. They need to know all aspects of the building designing processes like mechanical, electrical, structural, and environmental along with their Civil Engineering Concepts. As your mentors, we guide you to ensure you are on the right track. The tool training we provide is based on your practical life job experiences.

#### 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	Describe the basic knowledge of BIM used in Architectural design
CO2	Apply the typical concept for building plan, elevation and section.
CO3	Create different building components like walls, doors, windows, stairs, roofs by using advance Software like 3D Max.
CO4	Demonstrate the practical knowledge skill through software in the Orthographic and Isometric Projections drawing
CO5	Prepare map of residential and commercial buildings as per assumed specifications in the field of civil engineering

**3. MAPPING COURSE OUTCOMES WITH PO AND PSO**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	1	2
CO3	-	-	3	-	-	-	-	-	-	-	-	-	1	2	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	2	1	2
CO5	-	-	-	-	-	2	-	-	-	-	-	-	2	2	1

**4. COURSE PRE-REQUISITES:**

Students learn about recent techniques, case study & innovative outcome based learning to analyze and evaluate the concepts to make his personality competent enough to fulfill the gap between academic and industry.

**5. ENROLMENT CRITERIA: Interested Students of III Year (Civil Engineering)****6. CERTIFICATION CRITERIA: Mandatory Fulfillments of Criteria 1 and 2**

**Criteria 1: 80% Attendance**

**Criteria 2: 80% or above marks in Certification Exam**

**7. WEEK-WISE COURSE OUTLINE:****Module 01 – Understand the BIM Completely Before Getting into the Tool**

- What is BIM?
- BIM Origins
- Necessity of BIM
- BIM requirement in current construction industries
- BIM Future
- Advantage over Traditional Construction Process
- Construction Pains & Hazards
- BIM Lifecycle



- BIM Benefits

### **Module 02 – Knowledge about ACS**

- About Architecture
- Architecture Terms
- About Civil Site
- Civil Site Elements
- About Structure
- Structure Classified in Different ways

### **Module 03 -UI Tour, Project Navigation and View Creation**

- Introducing of revit Interface
- Plans
- Sections and elevations
- Call outs and drafting views
- Placement and properties of grids and levels
- Project Browser and Properties bar
- Introduction to basic Revit elements

### **Module 04 – ACS Overview**

- Work Process & Flow of Work
- Sub Section
- Our Scope of Work
- Sample Input
- Sample Output

### **Module 05 – Advance Modeling of Structural Elements**

- Foundation and types
- Columns
- Placing Structural Columns
- Beams and Framing Systems
- Adding Beams and Beam Systems
- Modifying Beams

### **Module 06 - Wall Creation Manipulation**

- Wall types
- Working with levels





- Attaching walls
- Editing wall shapes
- Wall Openings
- Editing tools

#### **Module 07 -Floors, Roofs and Ceilings**

- Controlling slopes
- Basic roof design and examples
- Exercise on the creation of floors, roofs and ceilings introducing sketching

#### **Module 08 -Window, Door and Component Use**

- Family terminology
- Component placement
- Element hosting
- Exercise on Doors, Windows and Level-hosted elements

#### **Module 09- Stairs Ramps and Railings**

- Characteristics of simple staircases and ramps
- Hand railing integral to the stairs and ramps
- Exercise on stairs and ramps
- Modeling of railing

#### **Module 10 – Types of Drawings & LOD Concept**

- Scale of Drawings
- Concept Drawing/Sketches
- Design Drawing
- Construction Drawing/Working Drawing
- Shop Drawing
- As-built Drawing
- Specialized and Miscellaneous Drawing Type
- Fundamental LOD Definitions
- LOD Specifications
- Level of Development vs. Level of Detail
- Advantages of LOD BIM

#### **Module 11 – Concept of Shop Drawings**



- About Shop Drawing
- Architectural Shop Drawing
- Structural Shop Drawing
- Information to be included on Shop Drawing
- Different Aspects of Shop Drawing
- Dos & Don'ts of Shop Drawings
- IFC Drawing vs Shop Drawing

### **Module 12 - Basic Drafting Standards with Implementation in revit**

- Purpose of Drafting
- List of Basic Rules of Drafting
- Drawing Sheet Sizes
- About Annotation
- Line
- Text
- Dimension
- Symbol
- Abbreviation
- Title Block

### **Module 13- Schedules, Legends and Quantity takeoff**

- Creating different schedule
- Legends
- Extracting out quantity
- Material take off
- Different options in Schedule

### **Module 14- Basic Subdivision and Collaboration**

- Central file creation
- Linking of other files
- Import and export tools
- Project team collaboration techniques
- Work sets
- Exercise on work sets

### **Module 15 - Input Document Study**

- Purpose of Project Study
- Construction Document Sheet Numbers and Order
- Architectural Documents



- Structural Documents
- MEP Documents
- Some Basic Floor Plan Symbols
- Basic steps of Document Study
- Folding a Large Format Drawing

### **Module 16 - Basic Concept of MEP and Coordination**

- BIM Coordination
- Benefits of using BIM Coordination
- Elementary Architectural and Structural Coordination
- Basic Concept of MEP
- Methods of MEP Coordination

### **Module 17 - Concept of RFI**

- About RFI
- Why are RFIs important?
- RFI Process: When is an RFI needed?
- How to Submit Better RFIs
- What should a RFI look like?
- Pinnacle RFI Format
- Pinnacle RFI Log
- RFI best practices
- RFI Management Tools

#### **2.1.4 COURSE TITLE: Residential House Planning as per NBC (COURSE CODE: AOC-DEP-CIV-RHPN)**

1. **COURSE DESCRIPTION:** In this course student will learn residential house planning as per NBC and using software as well as site visits. Student will plan residential house using orientation and Vastu.
2. **COURSE OUTCOMES:**



S. No.	Course Outcomes
CO1	Describe the basic knowledge of planning used in Architectural design
CO2	Apply the typical concept for drawing building plan, elevation and section.
CO3	Create different building components like walls, doors, windows, stairs, roofs as per provision of NBC
CO4	Demonstrate the practical knowledge skill through Orthographic and Isometric Projections drawing
CO5	Prepare map of residential and commercial buildings as per assumed specifications in the field of civil engineering

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	1	2
CO3	-	-	3	-	-	-	-	-	-	-	-	-	1	2	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	2	1	2
CO5	-	-	-	-	-	2	-	-	-	-	-	-	2	2	1

### 4. COURSE PRE-REQUISITES:

Students learn about recent techniques, case study & innovative outcome based learning to analyze and evaluate the concepts to make his personality competent enough to fulfill the gap between academic and industry.

### 5. ENROLMENT CRITERIA: Interested Students of II Year (Civil Engineering)

### 6. CERTIFICATION CRITERIA: Mandatory Fulfillments of Criteria 1 and 2

Criteria 1: 80% Attendance

Criteria 2: 80% or above marks in Certification Exam

### 7. WEEK-WISE COURSE OUTLINE:

S. No.	WEEK	Module	TOPIC	No. of Hours
1	WEEK-01	Description of fundamental terms About AutoCAD	Introduction about CAD & its Advantages, future scope, User Interface, Line Command, Linear Aligned & Angular Dimension, Drawing related to Command	3
2	WEEK-02	Tools Related With Planning	Draw Tool (Circle, Rectangle etc.) Modify Tool (Copy, Mirror, Array etc.), Unit Setting, Drafting Setting, Properties Tab, Layer Tools	3



3	WEEK-03	Tools Related With Planning	Block Command & block Creation, Hatching & gradient, Dimension Tool, Text Command, Table Command, Tool palates & Design center	3
4	WEEK-04	Residential Building Plan & Building Planning Techniques	Drawing of a architectural plan based on Building By laws, Vastu Shasta, Sun Orientation	3
5	WEEK-05	Residential Building Plan & Building Planning Techniques	Drawing of a architectural plan based on Sun Orientation	3
6	WEEK-06	Building Elevation & Section	Drawing of Building Elevation & section, print	3
7	WEEK-07	3D Building & uses of 3D Tools With material	Convert 2D Building Into 3D building Using Tool, Extrude, Loft, Sweep And Revolve Command	3
8	WEEK-08	Plumbing & Electrical Plan	Drawing of a plumbing plan, tools used in plumbing, Fixture schedule, Symbol Drawing of a Electricity plan, tools used in Electricity, Plan, Fixture schedule, Symbol	3
9	WEEK-09	Site Visit	Visit Related with future development & enhance the knowledge of civil Engineering	3
10	WEEK-10	Project	As per practical data or any live Project	3

### 2.1.5 COURSE TITLE: Sketch up 3D Modeling (COURSE CODE: AOC-DEP-CIV-TDM)

**1. COURSE DESCRIPTION:** In this Sketch up 3D Modeling Training Module, We teach you and guide you towards many career opportunities in 3D modeling for civil engineers and architects. They need to know all aspects of the building designing processes like mechanical, electrical, structural, and environmental along with their Civil Engineering Concepts. As your mentors, we guide you to ensure you are on the right track. The tool training we provide is based on your practical life job experiences.

### 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	To remember the basic commands of Sketch up modeling
CO2	To understand the different plans of building like Orthographic projections, Isometric Projections
CO3	To Apply the typical Sketch up commands in software.



CO4	To Analyze the different Structural Component by using of Sketch up modelings
CO5	To Prepare map of residential and commercial buildings as per assumed specifications in the field of civil engineering

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	1	2
CO3	-	-	3	-	-	-	-	-	-	-	-	-	1	2	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	2	1	2
CO5	-	-	-	-	-	2	-	-	-	-	-	-	2	2	1

### 4. COURSE PRE-REQUISITES:

Students learn about recent techniques, case study & innovative outcome based learning to analyze and evaluate the concepts to make his personality competent enough to fulfill the gap between academic and industry.

### 5. ENROLMENT CRITERIA: Interested Students of II Year (Civil Engineering)

### 6. CERTIFICATION CRITERIA: Mandatory Fulfillments of Criteria 1 and 2

Criteria 1: 80% Attendance

Criteria 2: 80% or above marks in Certification Exam

### 7. WEEK-WISE COURSE OUTLINE:

Civil 2nd Year			
2D & 3D Planning and Modeling Using Skectchup			
To model a house from scratch using SKETCHUP 3D modeling Software			
Week	Description of Program	Resource Person	Hours
1	Hand drafting session Light drafting of plan, Dark drafting of plan and Elevation drafting	Ms. Shivanshi	3
2	Learning basics of AutoCAD & Drafting plan in AutoCAD		3
3	Drafting elevation and finishing drawings in AutoCAD	Ms. Shivanshi	3
4	Learning basics of sketch up	Ms. Shivanshi	3



5	Fundamentals of 3D Modelling in Skeetchup	Ms. Shivanshi	3
6	Designing Components & Materials from scratch	Ms. Shivanshi	3
7	Essentials like Scenes, Styles, and Plugging	Ms. Shivanshi	3
8	Parametric Design using Skeetchup	Ms. Shivanshi	3
9	Interior and exterior design with lighting components	Ms. Shivanshi	3
10	Project Planning and Modeling	Ms. Shivanshi	3

## 2.2 DEPARTMENT OF COMPUTER ENGINEERING

S. No.	Course ID	Course Name	No. of Modules	Course Duration	Course Facilitator
1	AOC-DEP-CSE-AZAI	Microsoft Azure Academia Program: Azure AI Fundamentals	12	36 Hours	Mr. Manish Dubey
2	AOC-DEP-CSE-AZPY	Microsoft Azure Academia Program: Python Programming	12	36 Hours	Dr. Praveen Gupta
3	AOC-DEP-CSE-AZDF	Microsoft Azure Academia Program: Microsoft Azure Data Fundamentals	12	36 Hours	Dr. Neelam Chaplot
4	AOC-DEP-CSE-AZBD	Microsoft Azure Academia Program: Big Data	12	36 Hours	Dr. Shalini Puri
5	AOC-DEP-CSE-AZBI	Microsoft Azure Academia Program: POWER BI “DATA ANALYTICS”	12	36 Hours	Ms. Nikita Jain
6	AOC-DEP-CSE-AZCI	Microsoft Azure Academia Program: Cloud Infrastructure and Security	12	36 Hours	Dr. Sonal Sharma
7	AOC-DEP-CSE-AZHD	Programming in Hadoop	12	36 Hours	Mr. Vishal Choudhary
8	AOC-DEP-CSE-DSPY	Data Science with Python	12	36 Hours	Mr. Praveen Yadav
9	AOC-DEP-CSE-SETS	Selenium Testing	12	36 Hours	Mr Nimish Arvind





## 2.2.1 COURSE TITLE: Microsoft Azure Academia Program: Azure AI Fundamentals (COURSE CODE: AOC-DEP-CSE-AZAI)

**1. COURSE DESCRIPTION:** The Azure AI Fundamentals course is designed for anyone interested in learning about the types of solution artificial intelligence (AI) makes possible, and the services on Microsoft Azure that you can use to create them.

### 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
CO4	Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
CO5	Demonstrate proficiency in applying scientific method to models of machine learning

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

**4. COURSE PRE-REQUISITES:** Artificial Intelligence is considered to be one of the most rewarding fields in the domain of IT and in order to learn Artificial Intelligence, there are first some subjects that you will have to learn and gain the required knowledge of. These are usually referred to as the prerequisites to learning Artificial Intelligence. In this we consider the Strong knowledge of Mathematics, Good command over programming languages, Good Analytical Skills, Ability to understand complex algorithms and Basic knowledge of Statistics and modeling.

**5. ENROLMENT CRITERIA:** Interested Students of II Year (All Branches)

**6. CERTIFICATION CRITERIA:** Mandatory Fulfilment of Criteria 1 and 2

**Criteria 1: 80% Attendance, and**

**Criteria 2: 60% or above marks in Certification Exam****7. WEEK-WISE COURSE OUTLINE:**

<b>WEEK</b>	<b>MODULE-WISE CONTENTS</b>
<b>WEEK – 1</b> <b>( 3 Hours)</b>	<b>MODULE – 1: ARTIFICIAL INTELLIGENCE: HISTORY, TRENDS &amp; FUTURE</b> <ul style="list-style-type: none"> <li>• Introduction to artificial intelligence</li> <li>• Problem solving at state space search</li> <li>• Uniformed Search</li> </ul> <b>MODULE – 2: PROBLEM SOLVING IN ARTIFICIAL INTELLIGENCE</b> <ul style="list-style-type: none"> <li>• Heuristic search</li> <li>• Informed search</li> <li>• Constraints satisfaction problems</li> </ul>
<b>WEEK – 2</b> <b>(3 hours)</b>	<b>MODULE – 3: PROBLEM SOLVING BY SEARCH</b> <ul style="list-style-type: none"> <li>• Search AND / OR graphs</li> <li>• Game playing</li> <li>• Minimax and alpha / beta</li> </ul>
<b>WEEK – 3</b> <b>(3 hours)</b>	<b>MODULE – 4: INTRODUCTION TO KNOWLEDGE REPRESENTATION &amp; REASONING</b> <ul style="list-style-type: none"> <li>• Introduction to Knowledge Representation</li> <li>• Propositional logic</li> </ul>
<b>WEEK – 4</b> <b>(3 hours)</b>	<b>MODULE – 5: KNOWLEDGE REPRESENTATION &amp; REASONING: FIRST ORDER LOGIC</b> <ul style="list-style-type: none"> <li>• First Order Logic I</li> <li>• First Order Logic II</li> </ul>
<b>WEEK – 5</b> <b>(3 hours)</b>	<b>MODULE – 6: DIPLOMA IN FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE – FIRST ASSESSMENT</b> <ul style="list-style-type: none"> <li>• Fundamentals of Artificial Intelligence – First Assessment</li> </ul>
<b>WEEK – 6</b> <b>(3 hours)</b>	<b>MODULE-7: KNOWLEDGE REPRESENTATION &amp; REASONING: INFERENCE IN FIRST ORDER LOGIC</b> <ul style="list-style-type: none"> <li>• Inference in First Order Logic I</li> <li>• Inference in First Order Logic II</li> <li>• Answer Extraction</li> <li>• Procedural Control of Reasoning</li> </ul>
<b>WEEK – 7</b> <b>(3 hours)</b>	<b>MODULE-8: REASONING UNDER UNCERTAINTY</b> <ul style="list-style-type: none"> <li>• Bayesian Network</li> <li>• Decision Network</li> </ul>
<b>WEEK – 8</b> <b>(3 hours)</b>	<b>MODULE-9: PLANNING</b> <ul style="list-style-type: none"> <li>• Introduction to Planning</li> <li>• Plan Space Planning</li> <li>• Planning Graph and Graph Plan</li> </ul>
<b>WEEK – 9</b> <b>(3 hours)</b>	<b>MODULE-10: PLANNING AND DECISION MAKING</b> <ul style="list-style-type: none"> <li>• Practical Planning and Acting</li> <li>• Sequential Decision Problems</li> <li>• Making Complex Decisions</li> </ul>



<b>WEEK – 10 (3 hours)</b>	<b>MODULE-11: MACHINE LEARNING</b> <ul style="list-style-type: none"> <li>• Introduction to Machine Learning</li> <li>• Learning Decision Trees</li> </ul>
<b>WEEK- 11 (3 Hours)</b>	<b>MODULE-13: DIPLOMA IN FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE – SECOND ASSESSMENT</b> <ul style="list-style-type: none"> <li>• Fundamentals of Artificial Intelligence – Second Assessment Data Column</li> </ul>
<b>WEEK - 12</b>	1. CERTIFICATION EXAMINATION 2. CLOSING AND VALEDICTORY CEREMONY

### 2.2.2 COURSE TITLE: Microsoft Azure Academia Program: Python Programming (COURSE CODE: AOC-DEP-CSE-AZPI)

**1. COURSE DESCRIPTION:** Python is a popular general-purpose programming language. It is used in machine learning, web development, desktop applications, and many other fields. Fortunately for beginners, Python has a simple, easy-to-use syntax. This makes Python a great language to learn for beginners. This Python training course leads students from the basics of writing and running Python scripts to more advanced features such as file operations, regular expressions, working with binary data, and using the extensive functionality of Python modules. Extra emphasis is placed on features unique to Python, such as tuples, array slices, and output formatting.

#### 2. COURSE OUTCOMES:

CO1	Apply the programming constructs like variables, data structures and control flow structures
CO2	Develop programs using file handling, Object oriented paradigms, GUI controls
CO3	Demonstrate the use of exception handling, different libraries and database connectivity
CO4	Use Python IDEs like IDLE, Spyder, and PyCharm to develop programs
CO5	Design solutions of real-world computational problems using Python programs
CO1	Apply the programming constructs like variables, data structures and control flow structures

#### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2

*Dr. Mahesh Bunde*  
B.E., M.E., Ph.D.

Director

Poonima College of Engineering  
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Sikar, JAIPUR



CO 4	-	-	-	-	3		-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

**4. COURSE PRE-REQUISITES:**

Students should already be comfortable using the operating system like Linux or Windows on which they will be running Python. While not mandatory, basic skills with at least one other programming language like C, C++ are desirable.

**5. ENROLMENT CRITERIA: Interested Students of II Year (CSE Branch)****6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2**

**Criteria 1: 80% Attendance, and**

**Criteria 2: 70% or above marks in Certification Exam**

**7. WEEK-WISE COURSE OUTLINE:**

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1 (3 Hours)</b>	<b>MODULE – 1: An Overview of Python</b> <ul style="list-style-type: none"> <li>What is Python?</li> <li>Interpreted languages</li> <li>Advantages and disadvantages</li> <li>Downloading and installing</li> <li>Which version of Python</li> <li>Where to find documentation</li> </ul> <b>MODULE – 2: The Python Environment</b> <ul style="list-style-type: none"> <li>Structure of a Python script</li> <li>Using the interpreter interactively</li> <li>Running standalone scripts under Unix and Windows</li> </ul>
<b>WEEK – 2 (3 hours)</b>	<b>MODULE – 3: Getting Started</b> <ul style="list-style-type: none"> <li>Using variables</li> <li>String types: normal, raw and Unicode</li> <li>String operators and expressions</li> <li>Math operators and expressions</li> <li>Writing to the screen</li> <li>Command line parameters</li> <li>Reading from the keyboard</li> </ul> <b>MODULE – 4: Flow Control</b> <ul style="list-style-type: none"> <li>About flow control</li> <li>Indenting is significant</li> <li>The if and elif statements</li> <li>while loops</li> <li>Using lists</li> <li>Using the for statement</li> <li>The range () function</li> </ul>



<b>WEEK – 3 (3 hours)</b>	<b>MODULE – 5: Array Types</b> <ul style="list-style-type: none"><li>• list operations</li><li>• list methods</li><li>• Strings are special kinds of lists</li><li>• tuples</li></ul>
<b>WEEK – 4 (3 hours)</b>	<b>MODULE – 6: Working with Files</b> <ul style="list-style-type: none"><li>• Text file I/O overview</li><li>• Opening a text file</li><li>• Reading text files</li><li>• Raw (binary) data</li><li>• Writing to a text file</li></ul>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE-7: Dictionaries and Sets</b> <ul style="list-style-type: none"><li>• Dictionary overview</li><li>• Creating dictionaries</li><li>• Dictionary functions</li><li>• Fetching keys or values</li><li>• Testing for existence of elements</li><li>• Deleting elements</li><li>• Sets And Frozen Sets</li></ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-8: Functions</b> <ul style="list-style-type: none"><li>• Syntax of function definition</li><li>• Formal parameters</li><li>• Global versus local variables</li><li>• Passing parameters and returning values</li></ul>
<b>WEEK – 7 (3 hours)</b>	<b>MODULE-9: Sorting</b> <ul style="list-style-type: none"><li>• The sorted() function</li><li>• Alternate keys</li><li>• Multiple keys</li><li>• Lambda functions</li></ul>
<b>WEEK – 8 (3 hours)</b>	<b>MODULE-10: Errors and Exception Handling</b> <ul style="list-style-type: none"><li>• Dealing with syntax errors</li><li>• Exceptions</li><li>• Handling exceptions with try/except</li><li>• Cleaning up with finally</li></ul>
<b>WEEK – 9 (3 hours)</b>	<b>MODULE-11: Modules and Packages</b> <ul style="list-style-type: none"><li>• What is a module?</li><li>• The import statement</li><li>• Function aliases</li><li>• Packages</li></ul>



<b>WEEK – 10 (3 hours)</b>	<b>MODULE-12: Regular Expressions</b> <ul style="list-style-type: none"> <li>• RE Objects</li> <li>• Pattern matching</li> <li>• Parsing data</li> <li>• Sub expressions</li> <li>• Complex substitutions</li> <li>• RE tips and tricks</li> </ul>
<b>WEEK-11 (3 Hours)</b>	<b>MODULE-13: Highlights of the Standard Library</b> <ul style="list-style-type: none"> <li>• Working with the operating system</li> <li>• Grabbing web pages</li> <li>• Sending email</li> <li>• math and random</li> <li>• Accessing dates and times with datetime</li> <li>• Working with compressed files</li> </ul>
<b>Week-12</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

### 2.2.3 COURSE TITLE: Microsoft Azure Academia Program: Microsoft Azure Data Fundamentals (COURSE CODE: AOC-DEP-CSE-AZDF)

**1. COURSE DESCRIPTION:** The **Microsoft Azure Academia Program: Microsoft Azure Data Fundamentals** course offers the foundation you need to build your technical skills to start working with data in the cloud. Mastering the basics can help you jump-start your career and prepare you to dive deeper into other technical opportunities Azure offers.

#### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Students will be able to learn knowledge of core data concepts and related Microsoft Azure data services.
CO2	Students will be able to learn familiar with the concepts of relational and non-relational data
CO3	Students will be able to distinguish between the concepts of relational and non-relational data.
CO4	Students will be able to apply different types of data workloads such as transactional or analytical.

#### 5. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 3	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-



1															
CO 2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	2	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	2	-	-		-	-	-	-	-	-	-	3	-

### 3. COURSE PRE-REQUISITES:

Students should already know the basic concept of computing and Internet, and an interest in extracting insights from data. Student should be familiar with basic data-related concepts, such as working with tables of data in a spreads.

### 4. ENROLMENT CRITERIA:

**Interested Students of II Year (All Branches)**

### 5. CERTIFICATION CRITERIA: Mandatory Fulfillment of Criteria 1 and 2

**Criteria 1: 75% Attendance, and**

**Criteria 2: 70% or above marks in Certification Exam**

### 6. WEEK-WISE COURSE OUTLINE:

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1 (3 Hours)</b>	<b>MODULE – 1: Common Data Format</b> <ul style="list-style-type: none"> <li>Identify common data formats</li> <li>Options for storing data in files</li> <li>Options for storing data in databases</li> <li>Transactional data processing solutions</li> <li>Characteristic of data processing solutions</li> </ul>
<b>WEEK – 2 (3 Hours)</b>	<b>MODULE – 2: Data Processing Solutions</b> <ul style="list-style-type: none"> <li>Transactional data processing solutions</li> <li>Characteristic of data processing solutions</li> <li>Analytical data processing solutions</li> <li>Characteristic of Analytical data processing solutions</li> </ul>
<b>WEEK – 3 (3 hours)</b>	<b>MODULE – 3: Data Formats</b> <ul style="list-style-type: none"> <li>Identify data formats</li> <li>Structured data</li> <li>Semi-structured data</li> <li>Unstructured data</li> </ul>
<b>WEEK – 4 (3 hours)</b>	<b>MODULE – 4: Data stores</b> <ul style="list-style-type: none"> <li>File stores</li> <li>Databases</li> <li>Explore file storage</li> <li>Delimited text files</li> </ul>





<b>WEEK – 5 (3 hours)</b>	<b>MODULE-5: Object Notation</b> <ul style="list-style-type: none"> <li>JavaScript Object Notation (JSON)</li> <li>Extensible Markup Language (XML)</li> <li>Binary Large Object (BLOB)</li> <li>Optimized file formats</li> </ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-6: DATABASE</b> <ul style="list-style-type: none"> <li>Explore databases</li> <li>Relational databases</li> <li>Non-relational databases</li> <li>Key-value databases</li> <li>Document databases</li> <li>Column family databases</li> </ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE-7: Transactional Data Processing</b> <ul style="list-style-type: none"> <li>Atomicity</li> <li>Consistency</li> <li>Isolation</li> <li>Durability</li> </ul>
<b>WEEK – 8 (3 Hours)</b>	<b>MODULE-8: Analytical Data Processing</b> <ul style="list-style-type: none"> <li>Data lakes</li> <li>Data warehouse</li> <li>OLAP model</li> </ul>
<b>WEEK – 9 (3 Hours)</b>	<b>MODULE-9: Roles And Responsibilities For Data Workloads</b> <ul style="list-style-type: none"> <li>Responsibilities of Database Administrators</li> <li>Responsibilities of Data Engineers</li> <li>Responsibilities of Data Analysts</li> </ul>
<b>WEEK – 10 (3 Hours)</b>	<b>MODULE-10: Azure storage</b> <ul style="list-style-type: none"> <li>Azure Blob storage</li> <li>Azure File storage</li> <li>Azure Table storage</li> </ul>
<b>WEEK – 11 (3 Hours)</b>	<b>MODULE-11: Azure Cosmos DB</b> <ul style="list-style-type: none"> <li>Use cases for Azure Cosmos DB</li> <li>Azure Cosmos DB APIs</li> </ul>
<b>WEEK – 12 (3 Hours)</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

**2.2.4 COURSE TITLE:** Microsoft Azure Academia Program: Big Data (**COURSE CODE:** AOC-DEP-CSE-AZBD)

**1. COURSE DESCRIPTION:** Microsoft Azure provides robust services for analyzing big data. One of the most effective ways is to store your data in Azure Data Lake Storage Gen2 and then



process it using Spark on Azure Data bricks. Azure Stream Analytics (ASA) is Microsoft's service for real-time data analytics. Some examples include stock trading analysis, fraud detection, embedded sensor analysis, and web click stream analytics. ASA uses Stream Analytics Query Language, which is a variant of T-SQL. That means anyone who knows SQL will have a fairly easy time learning how to write jobs for Stream Analytics.

## 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	Get data into Azure Data Lake Storage (ADLS)
CO2	Monitor and optimize the performance of your data lakes
CO3	Create and run a Stream Analytics job
CO4	Scale a Stream Analytics job
CO5	Monitor and troubleshoot errors in Stream Analytics jobs

## 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	2	-	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	-	3	-	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	3	-	-	-	-	-	-	-	3	2	-

## 4. COURSE PRE-REQUISITES:

- Basic database knowledge
- SQL experience (recommended)
- Microsoft Azure account (recommended)

## 5. ENROLMENT CRITERIA: Interested Students of III Year (All Branches)

## 6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2

**Criteria 1: 60% Attendance, and**

**Criteria 2: 40% or above marks in Certification Exam**

## 7. WEEK-WISE COURSE OUTLINE:

WEEK	MODULE-WISE CONTENTS
WEEK – 1 (3 Hours)	<b>MODULE – 1: Introduction To Big Data</b> <ul style="list-style-type: none"> <li>• Data Storage and Analysis</li> <li>• Characteristics of Big Data</li> <li>• Big Data Analytics</li> <li>• Typical Analytical Architecture</li> </ul>



	<ul style="list-style-type: none"><li>• Requirement for new analytical architecture Challenges in Big Data Analytics</li><li>• Need of big data frameworks</li></ul>
<b>WEEK – 2 (3 hours)</b>	<b>MODULE – 2: Hadoop Framework</b> <ul style="list-style-type: none"><li>• Hadoop</li><li>• Requirement of Hadoop Framework</li><li>• Design principle of Hadoop</li><li>• Comparison with other system</li><li>• Hadoop Components</li><li>• Hadoop 1 vs Hadoop 2</li><li>• Hadoop Daemon's</li></ul>
<b>WEEK – 3 (3 hours)</b>	<b>MODULE – 3: HDFS</b> <ul style="list-style-type: none"><li>• HDFS Commands</li><li>• Map Reduce Programming: I/O formats</li><li>• Map side join</li><li>• Reduce Side Join</li><li>• Secondary sorting,</li><li>• Pipelining Map Reduce jobs</li></ul>
<b>WEEK – 4 (3 hours)</b>	<b>MODULE – 4: Hadoop Ecosystem</b> <ul style="list-style-type: none"><li>• Introduction to Hadoop ecosystem technologies:</li><li>• Serialization: AVRO,</li><li>• Co-ordination: Zookeeper</li><li>• Databases: HBase</li><li>• Hive</li><li>• Scripting language: Pig</li><li>• Streaming: Flink</li><li>• Storm</li></ul>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE – 5: Spark Framework</b> <ul style="list-style-type: none"><li>• Introduction to GPU Computing</li><li>• CUDA Programming Model</li><li>• CUDA API</li><li>• Simple Matrix</li><li>• Multiplication in CUDA</li><li>• CUDA Memory Model</li><li>• Shared Memory Matrix Multiplication</li><li>• Additional CUDA API Features.</li></ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-6: Data Analysis with Spark Shell</b> <ul style="list-style-type: none"><li>• Writing Spark Application</li><li>• Spark Programming in Scala</li><li>• Python</li><li>• R Java - Application Execution.</li></ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE-7: Spark SQL and GraphX</b> <ul style="list-style-type: none"><li>• SQL Context</li></ul>



	<ul style="list-style-type: none"> <li>• Importing and Saving data</li> <li>• Data frames – using SQL</li> <li>• GraphX overview</li> <li>• Creating Graph</li> <li>• Graph Algorithms</li> </ul>
<b>WEEK-8 (3 Hours)</b>	<b>MODULE-8: Spark Streaming</b> <ul style="list-style-type: none"> <li>• Overview</li> <li>• Errors and Recovery</li> <li>• Streaming Source</li> <li>• Streaming live data with spark</li> </ul>
<b>WEEK-9 (3 Hours)</b>	<b>MODULE-9: Recent Trends in Big Data Analytics</b> <ul style="list-style-type: none"> <li>• Latest trends in Big Data Analytics</li> <li>• Data as service</li> <li>• Predictive Analysis</li> <li>• Quantum Computing</li> <li>• Edge Computing</li> <li>• Natural Language Processing</li> <li>• Hybrid Clouds</li> </ul>
<b>WEEK-10 (3 Hours)</b>	<b>MODULE-10: Key roles for New Big Data Ecosystems</b> <ul style="list-style-type: none"> <li>• Sensing</li> <li>• Collection</li> <li>• Wrangling</li> <li>• Analysis</li> <li>• Storage</li> </ul>
<b>WEEK-11 (3 Hours)</b>	<b>MODULE-11: Traditional Business Intelligence versus Big Data</b> <ul style="list-style-type: none"> <li>• Inverted Indexing in Spark Sequence alignment problem in Spark</li> <li>• Implementation of Matrix algorithms in Spark Spark Sql programming</li> <li>• Building Spark Streaming application</li> </ul>
<b>WEEK - 12 (3 Hours)</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

### 2.2.5 COURSE TITLE: Microsoft Azure Academia Program: POWER BI “DATA ANALYTICS” (COURSE CODE: AOC-DEP-CSE-AZBI)

**1. COURSE DESCRIPTION:** Microsoft Business Intelligence or Power BI is a suite of business analytics tools to analyze data and share insights. Monitor your business and get answers quickly with rich dashboards available on every device. **Data Analytics** field is growing exponentially! **Power BI (Microsoft Business Intelligence)** offers basic data wrangling capabilities similar to Excel's Power Query. It also lets you create interactive visualizations, reports and dashboards with a few clicks or drag-and-drops; **type natural-language questions** about your



data on a dashboard; and handle files that are too large for Excel. Power BI transforms your company's data into **rich visuals** for you to collect and organize so you can focus on what matters to you. Stay in the know, spot trends as they happen, and push your business further

## 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	Student should be able to apply the basic knowledge of data mining, SQL and Data visualization.
CO2	Student should be able to analyze the queries, functions, techniques and Modeling of data.
CO3	Student should be able to design Dashboard and workspace by extracting and visualizing datasets.
CO4	Student should be able to create a dataset and based on that dataset design dashboard by extracting data.

## 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	3	-	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	-	3	-	-	-	-	-	-	-	-	-	3	-

## 4. COURSE PRE-REQUISITES:

Students should already be comfortable using the operating system like Linux or Windows on which they will be running Power BI tools. While not mandatory, basic skills with at least one other programming language like Excel, Data Mining are desirable.

- Understanding core data concepts.
- Knowledge of working with relational data in the cloud.
- Knowledge of working with non-relational data in the cloud.
- Knowledge of data analysis and visualization concepts.

## 5. ENROLMENT CRITERIA: Interested Students of III Year (All Branches)

## 6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2

**Criteria 1: 70% Attendance, and**

**Criteria 2: 60% or above marks in Certification Exam**

## 7. WEEK-WISE COURSE OUTLINE:

WEEK	MODULE-WISE CONTENTS
WEEK – 1	MODULE – 1: SQL SERVER INTRODUCTION



<b>(3 Hours)</b>	<ul style="list-style-type: none"> <li>• Data, Databases and RDBMS Software</li> <li>• Database Types: OLTP, DWH, OLAP</li> <li>• Microsoft SQL Server Advantages, Use</li> <li>• BI Components, Data Science Components</li> <li>• ETL, MSBI and Power BI Components</li> </ul>
<b>WEEK – 2 (3 hours)</b>	<b>MODULE-2: Introduction to Power BI</b> <ul style="list-style-type: none"> <li>• Power BI Job Roles in Real-time</li> <li>• Power BI Data Analyst Job Roles</li> <li>• Business Analyst - Job Roles</li> <li>• Power BI Developer - Job Roles</li> <li>• Power BI for Data Scientists</li> <li>• Power BI Training: Lab Plan</li> <li>• Understanding the Power BI Tools</li> </ul>
<b>WEEK – 3 (3 hours)</b>	<b>MODULE-3: Basic Report Design</b> <ul style="list-style-type: none"> <li>• Power BI Desktop Installation</li> <li>• Data Sources &amp; Visual Types</li> <li>• Get Data and Memory Tables</li> <li>• In-Memory xvelocity Database</li> <li>• Table and Tree Map Visuals</li> <li>• Format Button and Data Labels</li> <li>• Visual Interaction, Data Points</li> <li>• CSV and PDF Exports. Tooltips</li> <li>• Power BI EcoSystem, Architecture</li> </ul>
<b>WEEK-4 (3 Hours)</b>	<b>MODULE-4: Visual Sync, Grouping</b> <ul style="list-style-type: none"> <li>• Slicer Visual: Real-time Usage</li> <li>• Orientation, Selection Properties</li> <li>• Single &amp; Multi Select, CTRL Options</li> <li>• Slicer: Number, Text and Date Data</li> <li>• Slicer List and Slicer Dropdowns</li> <li>• Visual Sync Limitations with Slicer</li> <li>• Grouping: Real-time Use, Examples</li> <li>• Grouping Static / Fixed Data Values</li> <li>• Grouping Dynamic / Changing Data</li> <li>• Grouping Binned Data, Classification</li> </ul>
<b>WEEK-5 (3 Hours)</b>	<b>MODULE-5: Hierarchies, Filters</b> <ul style="list-style-type: none"> <li>• Creating Hierarchies in Power BI</li> <li>• Independent Drill-Down Options</li> <li>• Dependent Drill-Down Options</li> <li>• Conditional Drilldowns, Data Points</li> <li>• Drill Up Buttons and Operations</li> <li>• Filters: Types and Usage in Real-time</li> <li>• Visual Filter, Page Filter, Report Filter</li> <li>• Basic, Advanced and TOP N Filters</li> </ul>
<b>WEEK-6 (3 hours)</b>	<b>MODULE-6: Bookmarks, Azure, Modeling-I</b> <ul style="list-style-type: none"> <li>• Drill-thru Filters, Page Navigations</li> <li>• Bookmarks for Visual Filters</li> </ul>



	<ul style="list-style-type: none"> <li>• Bookmarks for Page Navigations</li> <li>• Buttons, Images with Actions</li> <li>• Bookmarks View &amp; Selection Pane</li> </ul> <p><b>MODULE-7: Bookmarks, Azure, Modeling-II</b></p> <ul style="list-style-type: none"> <li>• Azure Database Access, Reports</li> <li>• Import &amp; Direct Query with Power BI</li> <li>• SQL Queries and Enter Data</li> <li>• Data Modeling: Currency, Relations</li> </ul>
<b>WEEK-7 (3 hours)</b>	<p><b>MODULE-8: Visualization Properties-I</b></p> <ul style="list-style-type: none"> <li>• Stacked Charts and Clustered Charts</li> <li>• Line Charts, Area Charts, Bar Charts</li> <li>• 100% Stacked Bar &amp; Column Charts</li> <li>• Map Visuals: Tree, Filled, Bubble</li> <li>• Cards, Funnel, Table, Matrix</li> <li>• Scatter Chart: Play Axis, Labels</li> <li>• Series Clusters &amp; Selections</li> </ul>
<b>WEEK-8 (3 hours)</b>	<p><b>MODULE-9: Visualization Properties-II</b></p> <ul style="list-style-type: none"> <li>• Waterfall Chart and ArcGIS Maps</li> <li>• Info graphics, Icons and Labels</li> <li>• Color Saturation, Sentiment Colors</li> <li>• Column Series, Column Axis in Lines</li> <li>• Join Types: Round, Bevel, Miter</li> <li>• Shapes, Markers, Axis, Plot Area</li> </ul>
<b>WEEK-9 (3 Hours)</b>	<p><b>MODULE-10: Power Query</b></p> <ul style="list-style-type: none"> <li>• Power Query M Language Purpose</li> <li>• Power Query Architecture and ETL</li> <li>• Data Types, Literals and Values</li> <li>• Power Query Transformation Types</li> <li>• List, Record and Table Structures</li> <li>• Get Data, Table Creations and Edit</li> <li>• Group By and Advanced Options</li> <li>• Aggregations with Power Query</li> <li>• Replace Nulls: Fill Up, Fill Down</li> <li>• Extract, Format and Numbers</li> <li>• Removing Columns and Duplicates</li> <li>• Testing Parameters and PBI Canvas</li> <li>• Converting Lists to Table Data</li> <li>• Data Type Conversions, Expressions</li> <li>• Data Type Conversions, Expressions</li> </ul>
<b>WEEK-10 (3 Hours)</b>	<p><b>MODULE-11: DAX Functions</b></p> <ul style="list-style-type: none"> <li>• DAX: Importance in Real-time</li> <li>• DAX Architecture, Entity Sets</li> <li>• ROW Context and Filter Context</li> <li>• Creating, Using Measures with DAX</li> <li>• Dynamic Expressions, IF in DAX</li> </ul>





	<ul style="list-style-type: none"> <li>• Data Modeling Options in DAX</li> <li>• Detecting Relations for DAX</li> <li>• Modeling: Missing Relations</li> <li>• Logical, Mathematical Functions</li> <li>• Connection with CSV, MS Access</li> </ul>
<b>WEEK-11 (3 Hours)</b>	<b>MODULE-12: Power BI Service &amp; Power BI Mobile</b> <ul style="list-style-type: none"> <li>• Why Power Bi Service?</li> <li>• Comparison Power BI Free &amp; Premium</li> <li>• Logging into Power Bi Service</li> <li>• Importing data from Desktop to Service</li> <li>• Dataset menu</li> <li>• Working on reports</li> <li>• Dashboard overview</li> <li>• Workspace &amp; Gateways</li> <li>• Power Bi Mobile Overview</li> <li>• Excluding dataset from sharing</li> </ul>
<b>WEEK-12 (3 Hours)</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

## 2.2.6 COURSE TITLE: Microsoft Azure Academia Program: Cloud Infrastructure and Security (COURSE CODE: AOC-DEP-CSE-AZCI)

### 1. COURSE DESCRIPTION:

This course will provide a foundational understanding of what is required to secure a cloud ecosystem, regardless of the vendor. The concepts and principles discussed will help bridge the gaps between traditional and cloud architectures while accounting for the shifting thought patterns involving enterprise risk management. Students who complete this course will enter into any organization utilizing the cloud and immediately bring value to the infrastructure and security teams.

### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Apply cloud computing fundamental principles, including standard delivery models and service designs
CO2	Ability to analyze the foundational security practices that are required to secure modern cloud computing infrastructures.
CO3	Develop standard cloud security network designs and architecture models.
CO4	Develop complexity of cloud threat actors and techniques used to attack a cloud computing infrastructure.
CO5	Implement the regulatory requirements needed to secure data in the cloud.

**3. MAPPING COURSE OUTCOMES WITH PO AND PSO**

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	2	-	-	-	-	-	-	-	-	-	-	3	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	-
CO 4	-	-	-	-	2	-	-	-	-	-	-	-	-	2	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

**4. COURSE PRE-REQUISITES:**

Cloud computing is an advanced sector and requires you to be familiar with multiple subjects because it is related to many technologies. Here are the primary topics you should know to start learning cloud computing:

- **Programming Skills**
- **Familiarity with Databases**
- **Basics of Security and Privacy**
- **Knowledge of Agile Development**
- **Understanding of Virtualization**

**5. ENROLMENT CRITERIA: Interested Students of III Year (All Branches)****6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2**

**Criteria 1: 75% Attendance, and**

**Criteria 2: 75% or above marks in Certification Exam**

**7. WEEK-WISE COURSE OUTLINE:**

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1 (3 Hours)</b>	<b>MODULE – 1: Fundamentals of Cloud Computing and Architectural Characteristics.</b> <ul style="list-style-type: none"> <li>• Understand what is Cloud computing</li> <li>• Architectural and Technological Influences of Cloud Computing</li> <li>• Understand the Cloud deployment models</li> <li>• Public, Private, Community and Hybrid models</li> <li>• Software as a Service (SaaS)</li> <li>• Platform as a Service (PaaS)</li> <li>• Infrastructure as a Service (IaaS)</li> </ul>
<b>WEEK – 2 (3 hours)</b>	<b>MODULE – 2: - Security Design and Architecture for Cloud Computing.</b> <ul style="list-style-type: none"> <li>• Guiding Security design principles for Cloud Computing</li> <li>• Secure Isolation</li> <li>• Comprehensive data protection</li> <li>• End-to-end access control</li> <li>• Monitoring and auditing</li> </ul>



	<ul style="list-style-type: none"> <li>Quick look at CSA, NIST and ENISA guidelines for Cloud Security</li> </ul>
<b>WEEK – 3 (3 hours)</b>	<b>MODULE – 3: - Secure Isolation of Physical &amp; Logical Infrastructure.</b> <ul style="list-style-type: none"> <li>Compute, Network and Storage</li> <li>Common attack vectors and threats</li> <li>Secure Isolation Strategies</li> <li>Multitenancy, Virtualization strategies</li> <li>Inter-tenant network segmentation strategies</li> <li>Storage isolation strategies</li> </ul>
<b>WEEK – 4 (3 hours)</b>	<b>MODULE – 4: - Data Protection for Cloud Infrastructure and Services.</b> <ul style="list-style-type: none"> <li>Understand the Cloud based Information Life Cycle</li> <li>Data protection for Confidentiality and Integrity</li> <li>Common attack vectors and threats</li> <li>Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key Management, Assuring data deletion</li> <li>Data retention, deletion and archiving procedures for tenant data</li> <li>Data Protection Strategies</li> </ul>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE-5:- Enforcing Access Control for Cloud Infrastructure based Services</b> <ul style="list-style-type: none"> <li>Understand the access control requirements for Cloud Infrastructure.</li> <li>Common attack vectors and threats.</li> <li>Enforcing Access Control Strategies</li> <li>Compute, Network and Storage.</li> <li>Authentication and Authorization.</li> <li>Roles-based Access Control, Multi-factor authentication</li> <li>Host, storage and network access control options.</li> </ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-6: - Monitoring, Auditing and Management</b> <ul style="list-style-type: none"> <li>Proactive activity monitoring, Incident Response</li> <li>Monitoring for unauthorized access, malicious traffic, abuse of system privileges, intrusion</li> <li>detection, events and alerts</li> <li>Auditing – Record generation, Reporting and Management</li> <li>Tamper-proofing audit logs</li> <li>Quality of Services</li> <li>Secure Management</li> <li>User management</li> </ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE-7: Introduction to Cloud Design Patterns</b> <ul style="list-style-type: none"> <li>Introduction to Design Patterns</li> <li>Understanding Design Patterns Template</li> <li>Architectural patterns for Cloud Computing</li> <li>Platform-to-Virtualization &amp; Virtualization-to-Cloud</li> <li>Cloud bursting</li> </ul>



<b>WEEK-8 (3 Hours)</b>	<b>MODULE-8: Introduction to Identity Management in Cloud Computing.</b> <ul style="list-style-type: none"><li>• User Identification, Authentication, and Authorization in Cloud</li><li>• Infrastructure</li><li>• Be able to understand the concepts of Identity &amp; Access Management</li><li>• Single Sign-on</li><li>• Identity Federation</li><li>• Identity providers and service consumers</li><li>• The role of Identity provisioning</li></ul>
<b>WEEK-9 (3 Hours)</b>	<b>MODULE -9: Cloud Computing Security Design Patterns - I</b> <ul style="list-style-type: none"><li>• Security Patterns for Cloud Computing</li><li>• Trusted Platform Geo-tagging</li><li>• Cloud VM Platform Encryption</li><li>• Trusted Cloud Resource Pools</li><li>• Secure Cloud Interfaces</li></ul>
<b>WEEK-10 (3 Hours)</b>	<b>MODULE-10: Cloud Computing Security Design Patterns - II</b> <ul style="list-style-type: none"><li>• Security Patterns for Cloud Computing – Network Security, Identity &amp;</li><li>• Access Management &amp; Trust</li><li>• Secure On-Premise Internet Access</li><li>• Secure External Cloud Connection</li><li>• Cloud Denial-of-Service Protection</li><li>• Cloud Traffic Hijacking Protection</li><li>• Automatically Defined Perimeter</li><li>• Cloud Authentication Gateway</li></ul>
<b>WEEK-11 (3 Hours)</b>	<b>Module-11: Policy, Compliance &amp; Risk Management in Cloud Computing</b> <ul style="list-style-type: none"><li>• Be able to understand the legal, security, forensics, personal &amp; data privacy issues within Cloud environment</li><li>• Cloud security assessment &amp; audit reports.</li><li>• Laws &amp; regulatory mandates</li><li>• Personal Identifiable Information &amp; Data Privacy</li><li>• Privacy requirements for Cloud computing (ISO 27018)</li><li>• Metrics for Service Level Agreements (SLA)</li><li>• Metrics for Risk Management</li></ul>
<b>WEEK – 12 (3 Hours)</b>	<b>1. CERTIFICATION EXAMINATION 2. CLOSING AND VALEDICTORY CEREMONY</b>

**2.2.7 COURSE TITLE: Programming in Hadoop (COURSE CODE: AOC-DEP-CSE-HDP)****1. COURSE DESCRIPTION:**



- Fundamentals of Hadoop and YARN and write applications using them
- HDFS, MapReduce, Hive, Pig, Sqoop, Flume, and ZooKeeper
- Spark, Spark SQL, Streaming, Data Frame, RDD, GraphX and MLlib writing Spark applications
- Working with Avro data formats
- Practicing real-life projects using Hadoop and Apache Spark

## 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	Apply the concepts of Big Data and Hadoop ecosystem.,
CO2	Ability to analyze the Hadoop distributed file system (HDFS) for storing big data files
CO3	Develop Leverage Hadoop as a reliable, scalable MapReduce framework.
CO4	Develop MapReduce programs and implementing HBase.
CO5	Implement Hive and Pig scripts.

## 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO 12	PSO1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO 2	-	-	2	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	-
CO 4	-	-	-	-	2	-	-	-	-	-	-	-	-	2	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

## 4. COURSE PRE-REQUISITES:

To learn the core concepts of big data and hadoop ecosystem, the two important skills that professionals must know are –Java and Linux. Enterprise folks who have not previously worked with either of these can still get ahead in the hadoop mainstream by just getting their hands dirty on some basic knowledge of Java and Linux.

**5. ENROLMENT CRITERIA: Interested Students of IV Year (All Branches)**

**6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2**

**Criteria 1: 75% Attendance, and**

**Criteria 2: 75% or above marks in Certification Exam**

## 7. WEEK-WISE COURSE OUTLINE:

WEEK	MODULE-WISE CONTENTS
WEEK – 1 (3 Hours)	<b>MODULE – 1: Installation and Setup Hadoop</b> <ul style="list-style-type: none"> <li>• The architecture of Hadoop cluster</li> <li>• What is High Availability and Federation?</li> <li>• How to setup a production cluster?</li> </ul>



	<ul style="list-style-type: none"><li>• Various shell commands in Hadoop</li><li>• Understanding configuration files in Hadoop</li><li>• Installing a single node cluster with Cloudera Manager</li><li>• Understanding Spark, Scala, Sqoop, Pig, and Flume</li></ul>
<b>WEEK – 2 (3 hours)</b>	<b>MODULE – 2: - Introduction to Big Data Hadoop and Understanding HDFS and Map Reduce</b> <ul style="list-style-type: none"><li>• Introducing Big Data and Hadoop</li><li>• Where does Hadoop fit in?</li><li>• Two important Hadoop ecosystem components, namely, Map Reduce and HDFS.</li></ul>
<b>WEEK – 3 (3 hours)</b>	<b>MODULE – 3: - Deep Dive in Map Reduce</b> <ul style="list-style-type: none"><li>• Learning the working mechanism of Map Reduce</li><li>• Understanding the mapping and reducing stages in MR</li><li>• Various terminologies in MR like Input Format, Output Format, Practitioners, Combiners, Shuffle, and Sort.</li></ul>
<b>WEEK – 4 (3 hours)</b>	<b>MODULE – 4: - Introduction to Hive</b> <ul style="list-style-type: none"><li>• Introducing Hadoop Hive</li><li>• Detailed architecture of Hive</li><li>• Comparing Hive with Pig and RDBMS</li><li>• Working with Hive Query Language</li></ul> <p>Creation of a database, table, group by and other clauses</p>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE-5: Advanced Hive and Impala</b> <ul style="list-style-type: none"><li>• Indexing in Hive</li><li>• The ap Side Join in Hive</li><li>• Working with complex data types</li><li>• The Hive user-defined functions</li><li>• Introduction to Impala</li><li>• Comparing Hive with Impala</li></ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-6: - Introduction to Pig</b> <ul style="list-style-type: none"><li>• Apache Pig introduction and its various features</li><li>• Various data types and schema in Hive</li><li>• The available functions in Pig, Hive Bags, Tuples, and Fields</li><li>• Working with Pig in Map Reduce and local mode</li><li>• Loading of data</li></ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE-7: Flume, Sqoop and HBase</b> <ul style="list-style-type: none"><li>• Apache Sqoop introduction.</li><li>• Importing and exporting data.</li><li>• Performance improvement with Sqoop</li><li>• Sqoop limitation.</li><li>• Introduction to Flume and understanding the architecture of Flume</li></ul>



<b>WEEK-8 (3 Hours)</b>	<b>MODULE-8: Writing Spark Applications Using Scala</b> <ul style="list-style-type: none"> <li>Using Scala for writing Apache Spark applications</li> <li>Detailed study of Scala</li> <li>The need for Scala</li> <li>The concept of object-oriented programming Executing the Scala code</li> </ul>
<b>WEEK-9 (3 Hours)</b>	<b>MODULE -9: Spark framework</b> <ul style="list-style-type: none"> <li>Detailed Apache Spark and its various features</li> <li>Comparing with Hadoop</li> <li>Various Spark components</li> <li>Combining HDFS with Spark and Scalding</li> </ul>
<b>WEEK-10 (3 Hours)</b>	<b>MODULE-10: RDD in Spark</b> <ul style="list-style-type: none"> <li>Understanding the Spark RDD operations</li> <li>Comparison of Spark with Map Reduce</li> <li>What is a Spark transformation?</li> <li>Loading data in Spark</li> </ul>
<b>WEEK-11 (3 Hours)</b>	<b>Module-11: Data Frames and Spark SQL</b> <ul style="list-style-type: none"> <li>The detailed Spark SQL</li> <li>The significance of SQL in Spark for working with structured data processing.</li> <li>Spark SQL JSON support</li> <li>Working with XML data and parquet files</li> <li>Creating Hive Context</li> </ul>
<b>WEEK – 12 (3 Hours)</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

## 2.2.8 COURSE TITLE: Data Science with Python (COURSE CODE: AOC-DEP-CSE-DSPY)

**1. COURSE DESCRIPTION:** This course will introduce the learner to the basics of the python programming environment, including fundamental python programming techniques such as lambdas, reading and manipulating csv files, and the numpy library. The course will introduce data manipulation and cleaning techniques using the popular python pandas data science library and introduce the abstraction of the Series and Data Frame as the central data structures for data analysis, along with tutorials on how to use functions such as group by, merge, and pivot tables effectively. By the end of this course, students will be able to take tabular data, clean it, manipulate it, and run basic inferential statistical analyses.

### 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	Apply the programming constructs like variables, data structures and control flow structures





CO2	Develop programs using file handling, Object oriented paradigms, GUI controls
CO3	Demonstrate the use of pandas library, the main methods for Data Frames.
CO4	Use Python IDEs like IDLE, Spyder, and PyCharm to develop programs
CO5	Design solutions of real-world data science problems using Python programs

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

### 4. COURSE PRE-REQUISITES:

Students should already be comfortable using the operating system like Linux or Windows on which they will be running Python. While not mandatory, basic skills with at least one other programming language like C, C++ are desirable.

### 5. ENROLMENT CRITERIA: Interested Students of IV Year (CSE Branch)

### 6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2

**Criteria 1: 80% Attendance, and**

**Criteria 2: 70% or above marks in Certification Exam**

### 7. WEEK-WISE COURSE OUTLINE:

WEEK	MODULE-WISE CONTENTS
WEEK – 1 (3 Hours)	<b>MODULE – 1: An Overview of Python</b> <ul style="list-style-type: none"> <li>What is Python?</li> <li>Interpreted languages</li> <li>Advantages and disadvantages</li> <li>Downloading and installing</li> <li>Which version of Python</li> <li>Where to find documentation</li> </ul>
WEEK – 2 (3 hours)	<b>MODULE – 2: The Python Environment</b> <ul style="list-style-type: none"> <li>Structure of a Python script</li> <li>Using the interpreter interactively</li> <li>Running standalone scripts under Unix and Windows</li> <li>Using variables</li> </ul>



	<ul style="list-style-type: none"><li>• String types: normal, raw and Unicode</li><li>• String operators and expressions</li><li>• Math operators and expressions</li><li>• Writing to the screen</li><li>• Command line parameters</li><li>• Reading from the keyboard</li><li>• About flow control</li><li>• Indenting is significant</li><li>• The if and elif statements</li><li>• while loops</li><li>• Using lists</li><li>• Using the for statement</li><li>• The range () function</li></ul>
<b>WEEK – 3</b> <b>(3 hours)</b>	<b>MODULE – 3: Getting Started</b> <ul style="list-style-type: none"><li>• Using variables</li><li>• String types: normal, raw and Unicode</li><li>• String operators and expressions</li><li>• Math operators and expressions</li><li>• Writing to the screen</li><li>• Command line parameters</li><li>• Reading from the keyboard</li><li>• list operations</li><li>• list methods</li><li>• Strings are special kinds of lists</li><li>• tuples</li><li>• Array Types</li></ul>
<b>WEEK – 4</b> <b>(3 hours)</b>	<b>MODULE – 4: Flow Control</b> <ul style="list-style-type: none"><li>• About flow control</li><li>• Indenting is significant</li><li>• The if and elif statements</li><li>• while loops</li><li>• Using lists</li><li>• Using the for statement</li><li>• The range () function</li></ul> <b>Dictionaries and Sets</b> <ul style="list-style-type: none"><li>• Dictionary overview</li><li>• Creating dictionaries</li><li>• Dictionary functions</li><li>• Fetching keys or values</li><li>• Testing for existence of elements</li><li>• Deleting elements</li><li>• Sets And Frozen Sets</li></ul> <b>Functions</b> <ul style="list-style-type: none"><li>• Syntax of function definition</li></ul>



	<ul style="list-style-type: none"> <li>• Formal parameters</li> <li>• Global versus local variables</li> <li>• Passing parameters and returning values</li> </ul>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE-5: Python Data Frames I</b> <ul style="list-style-type: none"> <li>• Analysis, selection, and visualization techniques with Pandas Data Frames</li> <li>• Extracting and transforming Data Frames</li> </ul> <b>MODULE-6: Python Data Frames II</b> <ul style="list-style-type: none"> <li>• Advanced indexing</li> <li>• Rearranging and reshaping data Multiple keys</li> </ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-7: Modules and Packages</b> <ul style="list-style-type: none"> <li>• What is a module?</li> <li>• The import statement</li> <li>• Function aliases</li> <li>• Packages</li> <li>• RE Objects</li> <li>• Pattern matching</li> <li>• Parsing data</li> <li>• Sub expressions</li> <li>• Complex substitutions</li> <li>• RE tips and tricks</li> </ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE-8: Dictionaries and Sets</b> <ul style="list-style-type: none"> <li>• Dictionary overview</li> <li>• Creating dictionaries</li> <li>• Dictionary functions</li> <li>• Fetching keys or values</li> <li>• Testing for existence of elements</li> <li>• Deleting elements</li> <li>• Sets And Frozen Sets</li> </ul> <b>Importing Data in Python</b> <ul style="list-style-type: none"> <li>• Import data into Python from flat files such as .txt and .csv</li> <li>• Import data into Python from files native to other software such as Excel spreadsheets, Stata, SAS, and MATLAB files</li> <li>• Importing Data in Python from files from relational databases such as SQLite and PostgreSQL</li> </ul>
<b>WEEK – 8 (3 Hours)</b>	<b>MODULE-9: Functions</b> <ul style="list-style-type: none"> <li>• Syntax of function definition</li> <li>• Formal parameters</li> <li>• Global versus local variables</li> </ul>
<b>WEEK 9 (3 Hours)</b>	<b>MODULE-10 Importing Data in Python</b> <ul style="list-style-type: none"> <li>• Import data into Python from flat files such as .txt and .csv</li> </ul>



	<ul style="list-style-type: none"> <li>Import data into Python from files native to other software such as Excel spreadsheets, Stata, SAS, and MATLAB files</li> <li>Importing Data in Python from files from relational databases</li> </ul>
<b>WEEK10 (3 Hours)</b>	<b>MODULE-11</b> <ul style="list-style-type: none"> <li>Creating Pig and Hive UDF in Python</li> <li>Deploying Python for Map Reduce programming</li> </ul>
<b>WEEK11 (3 Hours)</b>	<b>MODULE-12</b> <b>Environment for scientific programming in Python</b> <ul style="list-style-type: none"> <li>Jupyter Notebook as an environment for scientific programming in Python, its structure and features.</li> </ul>
<b>WEEK 12 (3 Hours)</b>	Passing parameters and returning values <b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

## 2.2.9 COURSE TITLE: Selenium Testing (COURSE CODE: AOC-DEP-CSE-SETS)

**1. COURSE DESCRIPTION:** Selenium certification training helps you master this automation testing tool and become a certified A4Q Tester. This Selenium training covers WebDriver, Grid, IDE, handling IFrames, Alerts, and Modal Dialog box. With this Selenium course, you will learn to use supported plugins such as TestNG Framework, Robot Class, Cucumber, and Gherkin to control your automation environment. Get hands-on experience on widely used automation frameworks such as Data-Driven Framework, Keyword-Driven Framework, Hybrid Framework, and Behaviour Driven Development (BDD) Framework. This Instructor-led automation testing training online is created by top industry experts and allows you to work on real-life industry use cases.

### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Describe Selenium automated testing advantages
CO2	Deploying Selenium IDE functions and commands
CO3	Deploying JUnit and TestNG Plugin in Eclipse
CO4	Describe and use to Selenium WebDriver
CO5	Using Selenium Grid for software testing

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2



3															
CO 4	-	-	-	-	3		-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

**4. COURSE PRE-REQUISITES:**

Students should already be comfortable using the operating system like Linux or Windows on which they will be running Python. While not mandatory, basic skills with at least one other programming language like C, C++ are desirable.

**5. ENROLMENT CRITERIA: Interested Students of IV Year (CSE Branch)****6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2**

**Criteria 1: 80% Attendance, and**

**Criteria 2: 70% or above marks in Certification Exam**

**7. WEEK-WISE COURSE OUTLINE:**

WEEK	MODULE-WISE CONTENTS
WEEK – 1 (3 Hours)	Module 1: <ul style="list-style-type: none"> <li>• Introduction to Selenium</li> <li>• Selenium IDE Part I</li> </ul>
WEEK – 2 (3 hours)	Module 2: <ul style="list-style-type: none"> <li>• Selenium IDE Part II</li> <li>• Selenium IDE Part III</li> <li>• Selenium IDE Part IV</li> </ul>
WEEK – 3 (3 hours)	Module 3: Selenium Web Driver Automation
WEEK – 4 (3 hours)	Module 4: Fire Path installation
WEEK – 5 (3 hours)	Module 5: Searching elements
WEEK – 6 (3 hours)	Module 6: Advance user interactions cross browser testing
WEEK-7 (3 Hours)	Module 7: Introduction to TestNG PlugIn
WEEK – 8 (3 Hours)	Module 8: TestNG Terminologies
WEEK 9 (3 Hours)	Module 9: TestNG Data Providers
WEEK10 (3 Hours)	Module 10: Maven Integration Tool
WEEK11 (3 Hours)	Module 11: Web Driver Sample Programs
WEEK 12 (3 Hours)	Passing parameters and returning values 1. CERTIFICATION EXAMINATION 2. CLOSING AND VALEDICTORY CEREMONY

**2.3 DEPARTMENT OF ELECTRICAL ENGINEERING**

S. No.	Course ID	Course Name	No. of Modules	Course Duration	Course Facilitator
1	AOC-DEP-EE-AUTO	AUTONOM	3	80 Hours	Dr. Praveen Sonwane Dr. Gaurav Jain
2	AOC-DEP-EE-ET	Enabling Technology for Electric Transportation	5	35 Hours	Mr. Abhishek Singh Dr. Pankaj Gakhar
3	AOC-DEP-EE-MATL	Introduction to MATLAB for Engineering Problems	5	35 Hours	Mr. Rajendra Singh Ms. Jyoti Shukla
4	AOC-DEP-EE-MCES	Understanding Basics of Micro controller and Embedded Systems	4	35 Hours	Mr. Pankaj Verma Mr. Ajit Singh Rajawat
5	AOC-DEP-EE-VL	Introduction to Virtual Labs	10	30 Hours	Dr. Gaurav Jain Ms. Monika Verdiya

**2.3.1 COURSE TITLE: AUTONOM (COURSE CODE: AOC-DEP-EE-AUTO)****1. Course Summary:**

SAEINDIA is India's leading resource for mobility technology. As an individual member-driven society of mobility practitioners, the ownership of SAEINDIA rests with its members who are Individuals from the mobility community, which includes Engineers Executives from Industry, Government Officials, Academics and Students. SAEINDIA is a strategic alliance partner of SAE International registered in India as an Indian nonprofit engineering and scientific society dedicated to the advancement of the mobility industry in India.

AUTONOM INDIA 2021 Event is to "Design and Develop Autonomous 4 wheeled 4 seater vehicle for urban Mobility." Primary objective is to provide opportunities for Engineering Students to explore with a unique format of Hands on Technology Experience, Technology Display and Knowledge sharing. It will be maximizing the best possibility of accommodating all assigned challenges on a Digital platform with clear objectives and evaluation parameters while coming up with solutions for day-to-day mobility challenges faced by individuals under Indian Traffic conditions. The event tasks undergraduate students, after getting trained on IPG Carmaker, to come up with challenges of their own as well as given by us and recommend solutions for each challenge under Indian Traffic Conditions.

**2. Course Outcomes:**

1. Students will be able to learn the generation of minimum 10 different typical unsafe Indian driving scenarios with all relevant driving objects /actors using IPG carmaker simulation tool.
2. Students will be able to learn to generate min 10 edge cases which are difficult for a



conventional ADAS system to function in Indian driving condition.

3. Students will be able to learn the application of the most relevant ADAS sensors to ensure object detection, collision warning and collision avoidance in the identified unsafe driving scenarios

### 3. Course Outcomes & Program Outcomes Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1					3				3						3
CO2					3										
CO3									3					3	
CO4					3									3	
CO5															
Target					3				3					3	3

### 4. Enrollment Criteria:

1. Participants must be interested and engineering student (II/III Year Only)
2. Must provide the NOC if from other department.

### 5. Certification Criteria: Minimum 70% attendance

### 6. Course Prerequisite:

1. Basic knowledge of power electronics and electrical drives.
2. Idea of batteries and their types with their applications.

## 2.3.2 COURSE TITLE: Enabling Technology for Electric Transportation (COURSE CODE: AOC-DEP-EE-ET)

1. **Course Summary:** This course specialization entails about the electric vehicles mechanics & modelling step by step to enhance the awareness about the component used in electric vehicle.

Deterioration in air quality, global warming, and a decrease in petroleum resources are becoming the major threats to human beings. More and more stringent emissions and fuel consumption regulations are stimulating an interest in the development of safe, clean, and high-efficiency transportation. The global roadmap from the International Renewable Energy Agency (IRENA) to double renewables in the energy mix by 2030. In recent decades, the research and development activities related to of high efficiency, clean, and Modern Electric, Hybrid Electric Vehicles safe transportation.

### 2. Course Outcomes:

1. Students will be able to learn about govt. policies for electric vehicles in India.
2. Students will be able to learn about the element used (Power converter, battery, charger & motor etc.) in Electric vehicles.
3. Students will be able to design & modelling of Electric vehicle.
4. Students will be able to learn future trends in Electric vehicles.

### 3. Course Outcomes & Program Outcomes Mapping:





	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1								3					3		3
CO2								3		3					
CO3										3					3
CO4										3			3		
CO5															
Targ et								3		3			3		3

**4. Certification Criteria: Minimum 50% marks in Certification Exam and 70% attendance**

**5. Course Prerequisite:**

1. Basic knowledge of power electronics and electrical drives.
2. Idea of batteries and their types with their applications.

**6. Course Duration: 35 Hours**

**7. Course Outline:**

Module	Contents	Hours
1	Over View of Electric Vehicle & Govt. Policies	7
2	Electric Vehicle Mechanics and Modelling	8
3	Power Converters PM motor Drives and High energy batteries for EVs	10
4	Charging Stations & Wireless Chargers	6
5	Future Prospects of EVs	4

### 2.3.3 COURSE TITLE: Introduction to MATLAB for Engineering Problems (COURSE CODE: AOC-DEP-EE-MATL)

**1. Course Summary:** In this course, MATLAB's advanced features, syntaxes, and toolboxes will be discovered. In this students will explore scientific computing topics such as numerical linear algebra, numerical optimization, and ordinary and partial differential equations.

**2. Course Outcomes:**

1. Students will be able to explore different features, syntaxes, & toolboxes of MATLAB's software.
2. Students will be able to apply advanced graphics tool for 2D/3D plotting, graphics handles, publication quality graphics, and animation.
3. Students will be able to Acquire a reasonable level of competence in designing optimization algorithms, solve linear programming, constrained and unconstrained optimization problems by MATLAB.
4. Students will be able to apply different MATLAB tools, OOP & compile MATLAB for design different electronics circuits.

**3. Course Outcomes & Program Outcomes Mapping:**

  
**Dr. Mahesh Bunde**  
 B.E., M.E., Ph.D.  
 Director

Peernima College of Engineering  
 ISO-9001:2015 Institutional Area  
 Sitapura, JAIPUR



	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1											3				
CO2							3				3				
CO3							3								
CO4							3								
CO5															
Targ et							3				3				

**4. Enrollment Criteria:**

1. Participants must be interested and engineering student (II Year Only)
2. Must provide the NOC if from other department.

**5. Certification Criteria: Minimum 70% marks in Certification Exam nce****6. Course Duration: 35 Hours****7. Course Outline:**

Module	Contents	Hours
1	Functions: Reusable software components that can be applied in many different programs. Environment inside a function which is separated from the outside via a well-defined interface through which it communicates with that outside world	7
2	Programmer's Toolbox, built-in functions, polymorphism, function's behavior on the basis of the number and type of its inputs, MATLAB random number generator, advanced graphics tool for 2D/3D plotting, graphics handles, publication quality graphics, and animation.,	7
3	Selection, operators and logical operators, polymorphic functions, functions resistant to error, MATLAB's loop constructs: the for-loop and the while-loop, logical indexing, designing optimization algorithms, solve linear programming, constrained and unconstrained optimization problems by MATLAB	7
4	Data Types, convenient data types, heterogeneous collections of data via structs and cells, how to store points in time and time durations, MATLAB tools, OOP & compiles MATLAB	7
5	Project Development	7

**2.3.4 COURSE TITLE: Understanding Basics of Micro controller and Embedded Systems (COURSE CODE: AOC-DEP-EE-MCES)**

1. **Course Summary:** This course is focused on giving you real world coding experience and hands on project work with Microcontrollers. This course teaches and walks through the implementation of various interfaces with the ARM mbed platform. The mbed development platform is the fastest way to create products based on ARM microcontrollers. The project is



being developed by ARM, its Partners and the contributions of the global mbed Developer Community.

## 2. Course Outcomes:

1. Students will be able to Analyze the application requirement and determine system configuration
2. Students will be able to Integrate sensors and wireless connecting components with the microcontroller board.
3. Students will be able to Design and simulate the circuit
4. Students will be able to Build prototypes based on simulated design in to a working model

## 3. Enrollment Criteria:

1. Participants must be interested and engineering student (III Year Only)
2. Must provide the NOC if from other department.

## 4. Course Outcomes & Program Outcomes Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1									3						
CO2					3										
CO3					3										
CO4									3						
CO5															
Targ et					3				3						

## 5. Certification Criteria: Minimum 70% marks in Certification Exam.

## 6. Course Duration: 35 Hours

## 7. Course Outline:

Module	Contents	Hours
1	Introduction to Arduino Basics of Arduino board, Basic installation, Arduino IDE, programming, Arduino interface design with utility components and boards	7
2	Sensor Integration and Data Acquisition Different Sensors and their applications, Sensor integration with the board, Serial Communication, Data acquisition using sensor, Data visualization tools	8
3	Wireless Connectivity Introduction to wireless connecting modules, Arduino integration, Data transfer and presentation, Control Applications	10
4	Case study and Application Project Existing IOT system case study, IOT application identification, design and simulation, project prototype, Light control, Appliance control	10

## 2.3.5 COURSE TITLE: Introduction to Virtual Labs (COURSE CODE: AOC-DEP-EE-VL)

**1. Course Summary:**

Virtual Labs project is an initiative of Ministry of Human Resource Development (MHRD), Government of India under the aegis of National Mission on Education through Information and Communication Technology (NMEICT). While using the virtual labs students and faculty members who do not have access to good lab-facilities and/or instruments can learn through simulations. Virtual Labs do not require any additional infrastructural setup for conducting experiments at user premises. The simulations-based experiments can be accessed remotely via internet.

**2. Course Outcomes:**

1. To provide remote-access to simulation-based Labs in various disciplines of Science and Engineering.
2. To motivate students to perform experiments by arousing their curiosity.
3. To motivate students for learning basic and advanced ideas through remote experimentation.
4. To provide a Learning environment using the Virtual Labs where the students/ teachers can utilize the variety of tools for learning and self-evaluation.

**3. Course Outcomes & Program Outcomes Mapping:**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1					3				3						
CO2				3	3							3			
CO3					3				3			3			
CO4				3		3									
CO5															
Target				3	3	3			3			3			

**4. Enrollment Criteria:**

1. Participants must be interested and engineering student (IV Year Only)
2. Must provide the NOC if from other department.

**5. Certification Criteria: Minimum 70% marks in Certification Exam.****6. Course Duration: 24 Hours****7. Course Outline:**

Module	Contents	Hours
1	To study the Synchronization of alternator with infinite bus bar.	2
2	To determine the direct axis reactance ( $X_d$ ) and quadrature axis reactance ( $X_q$ ) of synchronous machine.	2
3	To determine positive sequence, negative sequence and zero sequence reactances of an alternator.	2
4	To measure the dielectric Strength of transformer oil.	2
5	To Study the effect of different shape of electrodes on dielectric (air) breakdown.	2
6	To Study the gas actuated Buchholz relay for oil filled transformer.	2
7	To Study the over-current relay and the effect of PSM and TSM.	2
8	To determine the sub-transient ( $x_d''$ ), transient ( $x_d'$ ) and steady state	2



	reactance (xd) of a synchronous machine.	
9	To Study the Ferranti Effect of a transmission line/cable.	2
10	To study the differential Protection of a three phase delta-delta connected transformer.	2

## 2.4 DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

S. No.	Course ID	Course Name	No. of Modules	Course Duration	Course Facilitator
1	AOC-DEP-ECE-DBR	Design of Basic Robots	6	30 Hours	Dr. Garima Mathur
2	AOC-DEP-ECE-OPTI	OptiSystem Fundamentals and Design Techniques	6	30 Hours	Mr. Manish Sharma
3	AOC-DEP-ECE-AI	Use of AI in Electronics	6	30 Hours	Mr. Amit Jain
4	AOC-DEP-ECE-PP	Python Programming: The basics	6	30 Hours	Mr. Durgesh Kumar

### 2.4.1 COURSE TITLE: Design of Basic Robots (COURSE CODE: AOC-DEP-EE-DBR)

**1. COURSE DESCRIPTION:** Robotics is a branch of engineering and science that includes electronics engineering, mechanical engineering and computer science and so on. This branch deals with the design, construction, use to control robots, sensory feedback and information processing. These are some technologies which will replace humans and human activities in coming years. These robots are designed to be used for any purpose but these are using in sensitive environments like bomb detection, deactivation of various bombs etc.

### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Understand basic components of robotics, classification of robots and their applications
CO2	Analysis of types of robot grippers, their usage and design considerations
CO3	Understand about various types of sensory devices their working and applications
CO4	Apply basic transformations related to the movement of the manipulator.
CO5	Design a robot mechanism to meet kinematics requirements and to write simple programs.

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----



	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3
CO 1	3	3	-	-	-	-	-	-	-	-	-	1	3	2	1
CO 2	3	3	3	-	-	-	-	-	-	-	-	1	3	2	1
CO 3	3	3	2	2	-	-	-	-	-	-	-	1	3	2	1
CO 4	3	2	2	2			-	-	-	-	-	1	3	2	1
CO 5	3	3	2	2	2		-	-	-	-	-	1	3	2	1

**4. COURSE PREREQUISITES:**

Basic Mathematics: Matrices, Differential equations

**5. ENROLMENT CRITERIA: Interested Students of III Year.****6. CERTIFICATION CRITERIA: Mandatory Fulfillment of****Criteria 1: 80% Attendance, and****Criteria 2: 60% Marks in Quiz****7. WEEK-WISE COURSE OUTLINE:**

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1</b> (5 Hours)	<b>MODULE – 1: Design of Basic Robots</b> Design of Basic Robots, classification of robots, workspace analysis, Manipulator Kinematics: Convention for affixing frames to links.
<b>WEEK – 2</b> (5 hours)	<b>MODULE – 2: DH Parameter</b> DH Representation, Derivation of Direct kinematic equations for various types of robots. Inverse Manipulator Kinematics: Solvability, algebraic vs. geometric, Pipers solution when three axes intersect, Examples of inverse manipulator kinematics, repeatability and accuracy.
<b>WEEK – 3</b> (5 hours)	<b>MODULE – 3: Jacobian</b> Jacobian: Velocities and static forces: Linear and rotational velocity of rigid bodies, velocity propagation from link to link,
<b>WEEK – 4</b> (5 hours)	<b>MODULE – 4: Singularities</b> Singularities, static forces in manipulators, jacobians in force domain, Cartesian transformation of velocities and static forces.
<b>WEEK – 5</b>	<b>MODULE – 5: Trajectory Generation</b> Trajectory Generation: General consideration in path description and generation, joint space schemes, collision free path planning, Robot programming.



(5 hours)	
<b>WEEK – 6</b> (5 hours)	<b>MODULE-6: Sensing and vision</b> Sensing and vision – range sensors, proximity sensors, touch sensors, force and torque sensors – Low level and high-level vision. Robot intelligence and task planning.
<b>WEEK - 7</b>	<b>CLOSING AND VALEDICTORY CEREMONY</b>

#### 2.4.2 COURSE TITLE: Opti System Fundamentals and Design Techniques (COURSE CODE: AOC-DEP-ECE-OPTI)

**1. COURSE DESCRIPTION:** Created to address the needs of research scientists, optical telecom engineers, system integrators, students and a wide variety of other users, OptiSystem satisfies the demand of the evolving photonics market for a powerful yet easy to use optical system design tool. OptiSystem enables users to plan, test, and simulate (in both the time and frequency domain):

- Optical network designs including OTDM, SONET/ SDH rings, CWDM, DWDM, PON, Cable, OCDMA
- Single-mode/multi-mode transmission
- Free space optics (FSO), Radio over fiber (ROF), OFDM (direct, coherent)
- Amplifiers and lasers (EDFA, SOA, Raman, Hybrid, GFF optimization, Fiber Lasers)
- Signal processing (Electrical, Digital, All-Optical)
- Transmitter and receiver (direct/coherent) sub system design
- Modulation formats (RZ, NRZ, CSRZ, DB, DPSK, QPSK, DP-QPSK, PM-QPSK, QAM-16, QAM-64)
- System performance analysis (Eye Diagram/ Q-factor/BER, Signal power/OSNR, Polarization states, Constellation diagrams, Linear and non-linear penalties)

#### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Explain the Optisystem user interface
CO2	Apply modular design with sub circuits, hierarchical blocks designs.
CO3	Create custom components.





CO4	Simulate optical systems with different parameters.
CO5	Transfer your design to PCB layout software

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

### 4. COURSE PRE-REQUISITES:

Basic knowledge of Electronics Circuit, Digital Electronics, Analog Electronics.

### 5. ENROLMENT CRITERIA: Interested Students of II Year.

### 6. CERTIFICATION CRITERIA: Mandatory 80% Attendance

### 7. WEEK-WISE COURSE OUTLINE:

WEEK	MODULE-WISE CONTENTS
WEEK – 1 (5 Hours)	MODULE – 1: Computer aided electrical and electronics drawing, Overview of analog & digital modules.
WEEK – 2 (5 hours)	MODULE – 2: Understand the Optisystem user interface. To capture circuit schematics, building & testing an analog circuit, analog instruments.
WEEK – 3 (5 hours)	MODULE – 3: Use interactive simulation to check your design, Use virtual instruments and analyses, building & testing a digital circuit, digital instruments.
WEEK – 4 (5 hours)	MODULE – 4: Apply modular design with sub circuits, hierarchical blocks.
WEEK – 5 (5 hours)	MODULE – 5: Create custom title blocks, Properly document your circuit designs, Work with design variants, Create custom components
WEEK – 6 (5 hours)	MODULE – 6: Overview of similar software.
WEEK - 7	1. CLOSING AND VALEDICTORY CEREMONY

**2.4.3 COURSE TITLE: Use of AI in Electronics (COURSE CODE: AOC-DEP-EE-AI)**

**1. COURSE DESCRIPTION:** The term “Artificial Intelligence” describes a wide variety of systems built to imitate how a human mind makes decisions and solves problems. For decades, researchers and engineers have explored how different types of AI can be applied to electrical and computer systems. These are some of the forms of AI that are most commonly incorporated into Electronics Engineering: **Expert systems, Fuzzy logic control systems, Artificial neural networks, Deep learning**

**2. COURSE OUTCOMES:**

S.No.	Course Outcomes
CO1	Understand the definition of AI, its applications in Electronics Engineering
CO2	Explain terms like machine learning, deep learning, and neural networks
CO3	Training of neural network using the training data using various machine learning methods
CO4	Apply AI techniques to real-world problems to develop intelligent systems.
CO5	Develop algorithms for real-world computational problems such as controlling algorithm for Robots

**3. MAPPING COURSE OUTCOMES WITH PO AND PSO**

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

**4. COURSE PRE-REQUISITES:**

Basic Mathematics: Matrices, Differential equations

**5. ENROLMENT CRITERIA: Interested Students of III Year.****6. CERTIFICATION CRITERIA: Mandatory Fulfilment of**

**Criteria 1: 80% Attendance, and**

**Criteria 2: 60% Marks in Quiz**

**7. WEEK-WISE COURSE OUTLINE:**



WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1 (5 Hours)</b>	<b>MODULE – 1: Introduction to Artificial Intelligence</b> Formalized symbolic logic: Propositional logic-first order predicate logic, wff conversion to clausal form, inference rules, the resolution principle, Dealing with inconsistencies and uncertainties, fuzzy logic.
<b>WEEK – 2 (5 hours)</b>	<b>MODULE – 2: Machine learning on Graph- Network Embedding</b> Probabilistic Reasoning Structured knowledge, graphs, frames and related structures, Knowledge organization and manipulation.
<b>WEEK – 3 (5 hours)</b>	<b>MODULE – 3: Searching for Intelligent Solutions</b>
<b>WEEK – 4 (5 hours)</b>	<b>MODULE – 4: Building Deep learning Networks.</b>
<b>WEEK – 5 (5 hours)</b>	<b>MODULE – 5: Matching Techniques, Knowledge organizations, Management.</b>
<b>WEEK – 6 (5 hours)</b>	<b>MODULE– 6: Natural Language processing, Pattern recognition, Expert systems</b>
<b>WEEK - 7</b>	<b>CLOSING AND VALEDICTORY CEREMONY</b>

#### 2.4.4 COURSE TITLE: Python Programming: The basics (COURSE CODE: AOC-DEP-EE-PP)

**1. COURSE DESCRIPTION:** Python is a popular general-purpose programming language. It is used in machine learning, web development, desktop applications, and many other fields. Fortunately for beginners, Python has a simple, easy-to-use syntax. This makes Python a great language to learn for beginners. This Python training course leads students from the basics of writing and running Python scripts to more advanced features such as file operations, regular expressions, working with binary data, and using the extensive functionality of Python modules. Extra emphasis is placed on features unique to Python, such as tuples, array slices, and output formatting.

#### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Apply the programming constructs like variables, data structures and control flow structures
CO2	Develop programs using file handling, Object oriented paradigms, GUI controls
CO3	Demonstrate the use of exception handling, different libraries and database connectivity
CO4	Use Python IDEs like IDLE, Spyder, and PyCharm to develop programs
CO5	Design solutions of real-world computational problems using Python programs

#### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-



1															
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	-	-	3		-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

**4. COURSE PRE-REQUISITES:**

Students should already be comfortable using the operating system like Linux or Windows on which they will be running Python. While not mandatory, basic skills with at least one other programming language like C, C++ are desirable.

**5. ENROLMENT CRITERIA: Interested Students of II Year.****6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1**

**Criteria 1: 80% Attendance, and**

**7. WEEK-WISE COURSE OUTLINE:**

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1 (5 Hours)</b>	<b>MODULE – 1: An Overview of Python</b> What is Python? Interpreted languages Advantages and disadvantages Downloading and installing Which version of Python Where to find documentation <b>MODULE – 2: The Python Environment</b> Structure of a Python script Using the interpreter interactively Running standalone scripts under Unix and Windows
<b>WEEK – 2 (5 hours)</b>	<b>MODULE – 3: Getting Started</b> Using variables String types: normal, raw and Unicode String operators and expressions Math operators and expressions Writing to the screen Command line parameters Reading from the keyboard <b>MODULE – 4: Flow Control</b> About flow control Indenting is significant The if and elif statements while loops Using lists Using the for statement



	The range () function
<b>WEEK – 3 (5 hours)</b>	<b>MODULE – 5: Array Types</b> list operations list methods Strings are special kinds of lists tuples <b>MODULE – 6: Working with Files</b> Text file I/O overview Opening a text file Reading text files Raw (binary) data Writing to a text file
<b>WEEK – 4 (5 hours)</b>	<b>MODULE-7: Dictionaries and Sets</b> Dictionary overview Creating dictionaries Dictionary functions Fetching keys or values Testing for existence of elements Deleting elements Sets And Frozen Sets <b>MODULE-8: Functions</b> Syntax of function definition Formal parameters Global versus local variables Passing parameters and returning values
<b>WEEK – 5 (5 hours)</b>	<b>MODULE-9: Sorting</b> The sorted() function Alternate keys Multiple keys Lambda functions <b>MODULE-10: Errors and Exception Handling</b> Dealing with syntax errors Exceptions Handling exceptions with try/except Cleaning up with finally



<b>WEEK – 6 (5 hours)</b>	<b>MODULE-11: Modules and Packages</b> What is a module? The import statement Function aliases Packages <b>MODULE-12: Regular Expressions</b> RE Objects Pattern matching Parsing data Subexpressions Complex substitutions RE tips and tricks
<b>WEEK-7 (5 Hours)</b>	<b>MODULE-13: Highlights of the Standard Library</b> Working with the operating system Grabbing web pages Sending email math and random Accessing dates and times with datetime Working with compressed files <b>MODULE-14: An Introduction to Python Classes</b> About o-o programming Defining classes Constructors Instance methods Instance data Class methods and data Destructors
<b>WEEK - 8</b>	<b>CLOSING AND VALEDICTORY CEREMONY</b>

## 2.5 DEPARTMENT OF INFORMATION TECHNOLOGY

S. No.	Course ID	Course Name	No. of Modules	Course Duration	Course Facilitator
1	AOC-DEP-IT-WEB	Web Design and Development	10	35 Hours	Ms. Seeta Gupta
2	AOC-DEP-IT-PYP	Advanced Python Programming	8	35 Hours	Mr. Shirish Nagar

**2.5.1 COURSE TITLE: Web Design and Development (COURSE CODE: AOC-DEP-IT-WEB)**

**2.1 COURSE DESCRIPTION:** The term “**Web Development**” refers to the process of designing, developing, and maintaining websites. Web design, web publishing, web development, and database management are all included. It is the building of an internet-based application, such as a website. The word Web Development is made up of two words, that is:

- Web: It refers to websites, web pages or anything that works over the internet.
- Development: Building the application from scratch.

Web Development can be classified into two ways:

- **Frontend Development:** The part of a website that the user interacts directly is termed as front end. It is also referred to as the ‘client side’ of the application. It includes HTML, CSS, JavaScript and Bootstrap
- **Backend Development:** Backend is the server side of a website. It is the part of the website that users cannot see and interact. It is the portion of software that does not come in direct contact with the users. It is used to store and arrange data. It includes PHP, Python, Java, Node.js etc.

**2.2 COURSE OUTCOMES:**

S.No.	Course Outcomes
CO1	Use different functions, variables, syntax and different technical tools for building any application
CO2	Apply the knowledge of web technology in developing web applications.
CO3	Develop solution to problems using appropriate method, technologies, framework, and web services.
CO4	Implement small to large scale project to provide live solution in web application development fields.

**2.3 MAPPING COURSE OUTCOMES WITH PO AND PSO**

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	-	-	3	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	2	-	-
CO 3	-	-	-	2	-	-	-	-	-	-	-	-	2	-	-
CO 4	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-
CO 5	-	-	3	-	-	-	-	-	-	-	-	-	3	-	-

**2.4 COURSE PRE-REQUISITES:**





There are no pre requisites for learning Web development. While not mandatory, basic skills with at least one other programming language like C, C++ are desirable.

**2.5 ENROLMENT CRITERIA: Interested Students of II Year**

**2.6 CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2**

**Criteria 1: 80% Attendance and**

**Criteria 2: 70% or above marks in Certification Exam**

**2.7 WEEK-WISE COURSE OUTLINE:**

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1 (3 Hours)</b>	<b>MODULE – 1: Introduction of Web Technologies</b> <ul style="list-style-type: none"> <li>• Introduction of web technologies</li> <li>• Careers in web technologies</li> <li>• Client and Server scripting languages</li> <li>• Difference b/w a Web Designer and Web Developer</li> <li>• Types of Websites (Static and Dynamic Websites)</li> </ul> <b>MODULE – 2: Html Introduction</b> <ul style="list-style-type: none"> <li>• What is Markup language?</li> <li>• Basic structure of Html</li> <li>• What are Html Elements?</li> <li>• What are Html Attributes?</li> </ul>
<b>WEEK – 2 (3 hours)</b>	<b>MODULE – 3: Html Structured and Media Tags</b> <ul style="list-style-type: none"> <li>• Table Tag, Div Tag, Frames, Header Tags</li> <li>• Paragraph, spans, pre tags</li> <li>• Anchor Links, Image tags, Iframe tags</li> </ul>
<b>WEEK – 3 (3 hours)</b>	<b>MODULE – 4: Working with Forms</b> <ul style="list-style-type: none"> <li>• Form Tag, Post and Get Method</li> <li>• Text Input, Text Area, Checkbox, Image Input and Radio</li> <li>• Select Option, Option Group, File Upload and Hidden Fields</li> <li>• Submit Button, Reset Button, Relation b/w Html Form and PHP</li> <li>• Create a Live Website Form</li> </ul>
<b>WEEK – 4 (3 hours)</b>	<b>MODULE – 5: Introduction of CSS</b> <ul style="list-style-type: none"> <li>• Introduction of CSS</li> <li>• Types of Style Sheets, Inline, Internal and External CSS</li> <li>• CSS for Website Layout and Print Layout</li> </ul> <b>MODULE – 6: CSS Properties</b> <ul style="list-style-type: none"> <li>• Type Properties, Font Properties</li> <li>• Block Properties, Box Model Properties</li> <li>• List Properties, Border Properties</li> <li>• Positioning Properties, Properties Useful in Real-time Designing</li> </ul>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE-7: JavaScript</b> <ul style="list-style-type: none"> <li>• Introduction of JavaScript</li> <li>• Introduction of Client Side Scripting</li> <li>• JavaScript Introduction, JavaScript Syntax</li> <li>• External JavaScript, Basics of JavaScript</li> <li>• JavaScript Comments, Variable, Global Variable</li> <li>• JavaScript Data Types, Operators, If Statement</li> </ul>



	<ul style="list-style-type: none"> <li>JavaScript Switch, Loop, Function</li> </ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-8: PHP and Mysql</b> <ul style="list-style-type: none"> <li>Introduction of PHP</li> <li>What is php? Install Php, Php Example</li> <li>Php echo and Print, Php \$ and \$\$</li> <li>Php variable and constant</li> </ul>
<b>WEEK – 7 (3 hours)</b>	<b>MODULE-9: Basics of PHP</b> <ul style="list-style-type: none"> <li>Php comments, Php data types</li> <li>Php operators, Php if else, Switch</li> <li>Php for loop, while and do while loop</li> <li>Php Break</li> </ul>
<b>WEEK – 8 (3 hours)</b>	<b>MODULE-10: PHP Functions and Arrays</b> <ul style="list-style-type: none"> <li>Php functions</li> <li>Examples of Functions</li> <li>Php Array</li> <li>Examples of Arrays</li> </ul>
<b>WEEK – 9 (3 hours)</b>	<b>MODULE-11: PHP Form, include and State Management</b> <ul style="list-style-type: none"> <li>Get and Post, Php Include, Php Require</li> <li>Php Cookie, Php Session</li> <li>Php File Upload</li> </ul>
<b>WEEK – 10 (3 hours)</b>	<b>MODULE-12: PHP MySql</b> <ul style="list-style-type: none"> <li>Mysql connect. Mysql Create Database</li> <li>Mysql Create Table, Mysql Select</li> <li>Mysql Insert, Mysql Update</li> <li>Mysql Delete, Order By</li> <li>Mysql Where</li> </ul>
<b>WEEK - 11</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

### 2.5.2 COURSE TITLE: Advanced Python Programming (COURSE CODE: AOC-DEP-IT-PYP)

**1. COURSE DESCRIPTION:** Python is a very versatile and easy-to-learn programming language with an extensive library of open tools allowing users to solve a variety of problems. Python has a rich ecosystem of libraries and tools for scientific computing and data science. There are libraries that provide a powerful interactive computing environment both on the console as well as on a web-browser. Python can interface relatively easily with other well- established languages like FORTRAN/C and C++. In addition to this Python also has libraries to build user interfaces, build web applications, interface to hardware, and a whole host of other domains. This makes Python an excellent language to learn opening up a world of possibilities to users who desire to use their computers more effectively.

### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
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CO1	Apply the programming constructs like variables, data structures and control flow structures
CO2	Develop programs using file handling, Object oriented paradigms, GUI controls
CO3	Demonstrate the use of network programming, threads and database connectivity
CO4	Use Python to extend and embed in C and C++ programs
CO5	Design solutions of real-world computational problems using Python programs

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2
CO 4	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	3	-	-	-	-	-	-	3	2	-

### 4. COURSE PRE-REQUISITES:

Students should already be comfortable using the operating system like Linux or Windows on which they will be running Python. While not mandatory, basic skills with at least one other programming language like C, C++ are desirable.

### 5. ENROLMENT CRITERIA: Interested Students of II Year and III Year IT

### 6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2

**Criteria 1: 80% Attendance and**

**Criteria 2: 70% or above marks in Certification Exam**

### 7. WEEK-WISE COURSE OUTLINE:

WEEK	MODULE-WISE CONTENTS
WEEK – 1 (5 Hours)	<b>MODULE – 1: Functional Programming</b> <ul style="list-style-type: none"> <li>• Lambdas</li> <li>• List Comprehensions</li> <li>• Set and Dictionary Comprehensions</li> <li>• Closures and Decorators</li> <li>• Generators and Coroutines</li> <li>• Generator Expressions</li> <li>• Declarative Programming</li> </ul> <b>MODULE – 2: Systems Programming</b> <ul style="list-style-type: none"> <li>• File Descriptors</li> <li>• Reading and Writing Files</li> <li>• Files and Directories</li> <li>• File Locking</li> <li>• Memory Mapped I/O</li> </ul>



	<ul style="list-style-type: none"><li>• Creating Processes</li><li>• Process Management</li><li>• Pipes and Signals</li></ul>
<b>WEEK – 2 (5 hours)</b>	<b>MODULE-3: Classes and Objects</b> <ul style="list-style-type: none"><li>• New Style Classes</li><li>• Inheritance</li><li>• Properties and Slots</li><li>• Static and Class Methods</li><li>• Abstract Base Classes</li><li>• Method Overriding</li><li>• Attributes and Functions</li><li>• Decorators and Factories</li><li>• Descriptors and Meta Classes</li></ul>
<b>WEEK – 3 (5 hours)</b>	<b>MODULE-4: Persistence and Databases</b> <ul style="list-style-type: none"><li>• Shelve and Pickle</li><li>• SQL Relational Databases</li><li>• Connection, Cursor, Row Objects</li><li>• Create, Read, Update, Delete</li><li>• Error Handling</li><li>• Query Results and Metadata</li><li>• Create and Aggregate Functions</li><li>• Exporting and Importing</li><li>• Transactions and Rollbacks</li><li>• Database Objects</li></ul>
<b>WEEK – 4 (5 hours)</b>	<b>MODULE-5: Network Programming</b> <ul style="list-style-type: none"><li>• Sockets and Addresses</li><li>• Establishing Connections</li><li>• TCP Clients and Servers</li><li>• UDP Clients and Servers</li><li>• UDS Clients and Servers</li><li>• Network Objects</li><li>• Socket Servers</li><li>• Secure Sockets Layer</li></ul>
<b>WEEK – 5 (5 hours)</b>	<b>MODULE-6: Web Programming</b> <ul style="list-style-type: none"><li>• JSON and XML</li><li>• Using XML-RPC</li><li>• Rest Interfaces</li><li>• WSGI and HTML</li><li>• Flask Framework</li><li>• Controller Functions</li><li>• Templates and Forms</li><li>• Database ORMs</li></ul>
<b>WEEK – 6 (5 hours)</b>	<b>MODULE-7: Threads and Concurrency</b> <ul style="list-style-type: none"><li>• Creating and Joining Threads</li><li>• Daemon Threads</li><li>• Thread Objects</li></ul>



	<ul style="list-style-type: none"> <li>• Timer Threads</li> <li>• Locks and Semaphores</li> <li>• Events and Conditions</li> <li>• Thread Locals</li> <li>• Thread Queues</li> <li>• Process Queues and Tasks</li> <li>• Process Pools</li> </ul>
<b>WEEK-7 (5 Hours)</b>	<b>MODULE-8: Extending and Embedding Python</b> <ul style="list-style-type: none"> <li>• Calling C/C++ from Python</li> <li>• Using ctypes</li> <li>• Extension Modules in C/C++</li> <li>• Raising Python Exceptions</li> <li>• Calling Python from C/C++</li> <li>• Embedding Python Interpreter</li> <li>• Importing Python Modules from C/C++</li> <li>• Converting Python Objects to C/C++</li> <li>• Invoking Python Functions from C/C++</li> </ul>
<b>WEEK - 8</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

## 2.6 DEPARTMENT OF MECHANICAL ENGINEERING

S. No.	Course ID	Course Name	No. of Modules	Course Duration	Course Facilitator
1	AOC-DEP-ME-CTA	CATIA	11	<b>32 Hours</b>	Mr. Sanjay Kumawat
1	AOC-DEP-ME-SW	SOLIDWORKS	11	32 Hours	Mr. Rahul Sharma
2	AOC-DEP-ME-TDP	3D Printing Technology	11	30 Hours	Mr. Sanjay Kumawat
4	AOC-DEP-ME-BAE	Basics of Automobile Engineering	9	30 Hours (3 hours per week for 10 weeks)	Mr. Kalpit Jain
5	AOC-DEP-ME-AAE	Advances of Automobile Engineering	9	30 Hours (3 hours per week for 10 weeks)	Mr. Kalpit Jain



### 2.6.1 COURSE TITLE: CATIA (COURSE CODE: AOC-DEP-ME-CTA)

CATIA is the reduced form of Computer Aided Three-Dimensional Interactive Application developed by French company Dassault Systems and marketed worldwide by IBM. Dassault is a French engineering giant active in the field of aviation, 3D design, 3D digital mock-ups, and product lifecycle management (PLM) software. CATIA is a solid modelling tool that unites the 3D parametric features with 2D tools and also addresses every design-to-manufacturing process. In addition to creating solid models and assemblies, CATIA also provides generating orthographic, section, auxiliary, isometric or detailed 2D drawing views. It is also possible to generate model dimensions and create reference dimensions in the drawing views. The bi-directionally associative property of CATIA ensures that the modifications made in the model are reflected in the drawing views and vice-versa.

CATIA is a product design software, which is ideal for surfaces, creating solids, drawings, assemblies, fabrication and analysis. This software is used in multiple industries like in manufacturing industries, automobile, aerospace, etc. to visualize designs in 3D. These industries use CATIA to model any product, to integrate 3D features with 2D tools and to develop 2D drawing views.

In developing countries like India, CATIA is largely in demand. The software delivers to most industrial CAD, CAM and CAE requirements. Various industries need experts in the various modules offered by CATIA.

An individual possessing skills of CATIA has numerous scope in various industries. The industries dealing in mechanical engineering, electrical engineering, system engineering, electrical systems & fluid systems need such experts. The responsibilities of a CATIA expert includes designing, drawings, sheet processing, engineering, machine development, developing equipment, electrical wiring, 3D circuit board layout, piping design or digital validation.

#### **What does CATIA do?**

CATIA provides the capability to visualize designs in 3D. When it was introduced, this concept was innovative. Since Dassault Systems did not have an expertise in marketing, they had revenue sharing tie-up with IBM which proved extremely fruitful to both the companies to market CATIA. In the early stages, CATIA was extensively used in the design of the Mirage aircrafts; however the potential of the software soon made it a popular choice in the automotive sector as well. As CATIA was accepted by more and more manufacturing companies, Dassault changed the product classification from CAD / CAM software to Project Lifecycle Management. The company also expanded the scope of the software.

CATIA can be used at different stages of the design - ideate, draw, test and iterate. The software comes with different workbenches ("modules") that allow CATIA to be used across varied industries – from parts design, surface design and assembly to sheet metal design. CATIA can also be used for CNC.

## 2. Course Objectives

The objective of this lab is to equip students with knowledge in the interface of three dimensional



designing software and to make students efficient to produce CAD designs. By the end of course one should also be able to understand what a machine drawing is and will also be able to produce machine drawings and gain knowledge about all symbols used in production drawings and how they are inserted in production drawings using design software's.

**3. COURSE OUTCOMES: After successful completion of this course students will be able to**

S. No.	Course Outcomes
CO1	Understand sketcher profile toolbar, modification toolbar, constraining toolbar, iso constraining of sketches using sketcher module of CATIA.
CO2	Creation of solids with following toolbars in part design module of CATIA: Sketch based features, Dress up features, Reference elements etc
CO3	Generate 2D drawings with dimensions, tolerances & surface finish from 3D model. Generate assembly drawings with BOM
CO4	Prepare assembly models using top down and bottom up approach. Generate assembly constraints, flexible assemblies, use of patterns in assembly

**4. MAPPING COURSE OUTCOMES WITH PO AND PSO**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	3	-	-	-	-	-	-	2	-	3	2
CO2	-	3	-	-	3	-	-	-	-	-	-	2	-	3	2
CO3	-	2	-	-	3	-	-	-	-	-	-	2	-	3	2
CO4	-	-	3	-	3	-	-	-	-	-	-	2	-	3	2

**5. COURSE PRE-REQUISITES:**

To be a successful CATIA designer, one should have some necessary skills, which will help them to grow in this field. Some important skills are:

- Drawing: It is the ability to draw shape & structure of any components of products.
- Imagination: The designer should have the ability to imagine the design.
- Visualization: This ability helps in visualizing the idea.
- Prior knowledge of CAD, CAM, CAE will be beneficial.
- Basic knowledge of the subjects.
- Ability to select material based on its properties to use it for designing.

**6. ENROLMENT CRITERIA: Interested Students of IV Year (8th Semester)**

**7. WEEK-WISE COURSE OUTLINE:**





WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1</b> <b>(3 Hours)</b>	<b>MODULE-1: Introduction to CATIA V5</b> <ul style="list-style-type: none"><li>○ Introduction to CATIA V5R20</li><li>○ CATIA V5 Workbenches</li><li>○ System Requirements</li><li>○ Getting Started with CATIA V5R20</li><li>○ Important Terms and Definitions</li><li>○ Important Terms and Definitions</li><li>○ Understanding the Functions of Mouse Buttons</li><li>○ Toolbars</li><li>○ Hot Keys</li><li>○ Color Scheme</li></ul>
<b>WEEK – 2</b> <b>(3 hours)</b>	<b>MODULE-2: Drawing Sketches in the Sketcher Part-I</b> <ul style="list-style-type: none"><li>○ The Sketcher Workbench</li><li>○ Starting a New File</li><li>○ Invoking the Sketcher Workbench Using the Sketch Tool</li><li>○ Invoking the Sketcher Workbench Using the Positioned Sketch Tool</li><li>○ Setting the Sketcher Workbench, Modifying Units, Modifying, Grid Settings</li><li>○ Understanding Sketcher Terms, Specification Tree, Grid, Snap to Point, Construction/Standard Element, Select Toolbar, Inferencing Lines</li><li>○ Drawing Sketches Using Sketcher Tools, Drawing Lines, Drawing Center Lines, Drawing Rectangles, Oriented Rectangles, and Parallelograms, Drawing Rectangles, Creating Points, Drawing Circles, Drawing Arcs, Drawing Profiles</li><li>○ Drawing Display Tools, Fit All In, Pan, Zoom In, Zoom Out, Zoom Area, Normal View, Splitting the Drawing Area into Multiple Viewports, Hiding and Showing Geometric Elements, Swapping Visible Space, Tutorial and Exercise</li></ul>
<b>WEEK – 3</b> <b>(3 hours)</b>	<b>MODULE-3: Drawing Sketches in the Sketcher Part-II</b> <ul style="list-style-type: none"><li>○ Other Sketching Tools in the Sketcher Workbench- Drawing Ellipses, Drawing Elongated Holes, Drawing Keyhole Profiles, Drawing Centered Rectangles</li><li>○ Editing and Modifying Sketches- Trimming Unwanted Sketched Elements, Trimming by Using the Quick Trim Tool, Filletting Sketched Elements, Chamfering Sketched Elements, Mirroring Sketched Elements, Translating Sketched Elements, Modifying Sketched Elements, Scaling Sketched Elements</li><li>○ Tutorial and Exercise</li></ul>
<b>WEEK – 4</b> <b>(3 hours)</b>	<b>MODULE-4: Constraining Sketches and Creating Base Features</b> <ul style="list-style-type: none"><li>○ Constraining Sketches</li></ul>



	<ul style="list-style-type: none"> <li>○ Concept of Constrained Sketches, Iso-Constraint Under-Constraint Over-Constraint Inconsistent</li> <li>○ Applying Geometrical Constraints Automatically, Applying Additional Constraints to the Sketch Applying Dimensional Constraints, Applying Contact Constraints, Applying Fix Together Constraints, Applying Auto Constraints</li> <li>○ Editing Multiple Dimensions</li> <li>○ Analyzing and Deleting Over-Defined Constraints</li> <li>○ Exiting the Sketcher Workbench</li> <li>○ Creating Base Features by Extrusion</li> <li>○ Extruding the Sketch along a Directional Reference</li> <li>○ Creating Thin Shaft Features</li> <li>○ Display Modes of the Model Shading (SHD) Shading with Edges Shading with Edges without Smooth Edges Shading with Edges and Hidden Edges, Shading with Material</li> <li>○ Assigning a Material to the Model</li> <li>○ Tutorial and Exercise</li> </ul>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE-5: Reference Elements and Sketch-Based Features</b> <ul style="list-style-type: none"> <li>○ Importance of Sketching Planes</li> <li>○ Reference Elements, Creating New Planes, Creating Points, Creating Reference Lines.</li> <li>○ Creating Drafted Filleted Pad Features</li> <li>○ Creating Multi-Pad Features</li> <li>○ Creating Pocket Features</li> <li>○ Creating Drafted Filleted Pocket Features</li> <li>○ Creating Multi-Pocket Features</li> <li>○ Creating Groove Features</li> <li>○ Extruding and Revolving Planar and Non planar Faces</li> <li>○ Projecting 3D Elements</li> <li>○ Tutorial and Exercise</li> </ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-6: Creating Dress-Up and Hole Features</b> <ul style="list-style-type: none"> <li>○ Advanced Modeling Tools- Creating Hole Features</li> <li>○ Creating Fillets</li> <li>○ Creating Chamfers</li> <li>○ Adding a Draft to the Faces of the Model</li> <li>○ Creating a Shell Feature</li> <li>○ Tutorial and Exercise</li> </ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE-7: Editing Features of a Model</b> <ul style="list-style-type: none"> <li>○ Editing Using the Definition Option</li> <li>○ Editing by Double-Clicking</li> <li>○ Editing the Sketch of a Sketch-Based Feature</li> <li>○ Redefining the Sketch Plane of Sketches</li> <li>○ Copying and Pasting Part Bodies</li> <li>○ Deactivating Features</li> </ul>



	<ul style="list-style-type: none"><li>○ Activating Deactivated Features</li><li>○ Defining Features in Work Object</li><li>○ Reordering Features</li><li>○ Understanding the Parent-Child Relationships</li><li>○ Measuring Elements</li><li>○ Tutorial and Exercise</li></ul>
<b>WEEK-8 (3 Hours)</b>	<b>MODULE-8: Transformation Features and Advanced Modeling Tools</b> <ul style="list-style-type: none"><li>○ Transformation Features</li><li>○ Translating Bodies, Rotating Bodies</li><li>○ Creating Symmetry Features</li><li>○ Mirroring Features and Bodies</li><li>○ Transforming the Axis System</li><li>○ Creating Rectangular Patterns</li><li>○ Creating Circular Patterns</li><li>○ Creating User Patterns</li><li>○ Uniform Scaling of Model</li><li>○ Non-uniform Scaling of Model</li><li>○ Working With Additional Bodies- Inserting a New Body</li><li>○ Inserting Features in the New Body</li><li>○ Applying Boolean Operations to Bodies</li><li>○ Adding Stiffeners to a Model</li><li>○ Generating Solid Combine</li><li>○ Tutorial and Exercise</li></ul>
<b>WEEK-9 (3 Hours)</b>	<b>MODULE-9: Assembly Modeling</b> <ul style="list-style-type: none"><li>○ Types of Assembly Design Approaches</li><li>○ Creating Bottom-up Assemblies</li><li>○ Creating Top-down Assemblies</li><li>○ Editing Assemblies</li><li>○ Exploding an Assembly</li><li>○ Tutorial and Exercise</li></ul>
<b>WEEK-10 (3 Hours)</b>	<b>MODULE-10: Working with the Drafting Workbench</b> <ul style="list-style-type: none"><li>○ Starting a New File in the Drafting Workbench</li><li>○ Type of Views</li><li>○ Generating Drawing Views</li><li>○ Generating Views Automatically</li><li>○ Generating Individual Drawing Views</li><li>○ Generating the Exploded View</li><li>○ Working with Interactive Drafting in CATIA V5</li><li>○ Editing and Modifying Drawing Views</li><li>○ Changing the Scale of Drawing Views</li><li>○ Modifying the Project Plane of the Parent View</li><li>○ Deleting Drawing Views</li><li>○ Rotating Drawing Views</li><li>○ Hiding Drawing Views</li><li>○ Modifying the Hatch Pattern of Section Views</li></ul>



	○ Tutorial and Exercise
<b>WEEK – 11 (2 Hours)</b>	<b>1. CERTIFICATION EXAMINATION 2. CLOSING AND VALEDICTORY CEREMONY</b>

## 2.6.2 COURSE TITLE: SOLIDWORKS (COURSE CODE: AOC-DEP-ME-SW)

**1. COURSE DESCRIPTION:-** SOLIDWORKS is used by millions of designers and engineers at hundreds of thousands of companies. It's one of the most popular design and engineering software on the market. Known for its range of features and high functionality, SOLIDWORKS is used across multiple professions and industries around the world.

SOLIDWORKS uses parametric design, which is why it's such an effective tool for designers and engineers. This means that the designer can see how changes will affect its neighboring components, or even the overall solution. For example, if the size of a single component is increased, this would affect the joint or hole it's attached to. This allows designers to spot and correct issues quickly and easily.

SOLIDWORKS was developed by MIT graduate Jon Hirschtick and was bought by Dassault Systems in 1997. The software now encompasses a number of programs that can be used for both 2D and 3D design.

SOLIDWORKS is used to develop mechatronics systems from beginning to end. At the initial stage, the software is used for planning, visual ideation, modeling, feasibility assessment, prototyping, and project management. The software is then used for design and building of mechanical, electrical, and software elements. Finally, the software can be used for management, including device management, analytics, data automation, and cloud services.

The SOLIDWORKS software solutions are used by mechanical, electrical, and electronics engineers to form a connected design. The suite of programs is aimed at keeping all engineers in communication and able to respond to design needs or changes.

### SOLIDWORKS Features

- Simple but sophisticated 3D CAD design
- Use templates and the CAD library for improved efficiency
- Automation and design reuse to speed up the process
- Cost estimation tools allow you to keep track in real-time
- Ensure potential risks are caught early with interference check
- Quickly produce 2D drawings for production



- Easily create animations and photorealistic renderings

## 2. Course Objectives

The course aims to give students and professionals the essentials that is needed to become a certified SOLIDWORKS associate. The course will help individuals use the software with confidence and design/draft the next innovative thing.

## 8. COURSE OUTCOMES:

After successful completion of this course students will be able to

S. No.	Course Outcomes
CO1	Understand sketcher profile toolbar, modification toolbar, constraining toolbar, iso constraining of sketches using sketcher module of SOLID WORKS.
CO2	Creation of solids with following toolbars in part design module of SOLID WORKS: Sketch based features, Dress up features, Reference elements etc
CO3	Generate 2D drawings with dimensions, tolerances & surface finish from 3D model. Generate assembly drawings with BOM
CO4	Prepare assembly models using top down and bottom up approach. Generate assembly constraints, flexible assemblies, use of patterns in assembly

## 4. MAPPING COURSE OUTCOMES WITH PO AND PSO

C O	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
C O1	3	-	-	-	3	-	-	-	-	-	-	2	-	3	2
C O2	-	3	-	-	3	-	-	-	-	-	-	2	-	3	2
C O3	-	2	-	-	3	-	-	-	-	-	-	2	-	3	2
C O4	-	-	3	-	3	-	-	-	-	-	-	2	-	3	2

## 6. COURSE PRE-REQUISITES:

To be a successful SOLIDWORKS designer, one should have some necessary skills, which will help them to grow in this field. Some important skills are:

- Drawing: It is the ability to draw shape & structure of any components of products.
- Imagination: The designer should have the ability to imagine the design.
- Visualization: This ability helps in visualizing the idea.
- Prior knowledge of CAD, CAM, CAE will be beneficial.
- Basic knowledge of the subjects.
- Ability to select material based on its properties to use it for designing.



**7. ENROLMENT CRITERIA: Interested Students of III Year (6<sup>th</sup> Semester)**

**8. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2**

**Criteria 1: 80% Attendance, and**

**Criteria 2: 70% or above marks in Certification Exam**

**9. WEEK-WISE COURSE OUTLINE:**

<b>WEEK</b>	<b>MODULE-WISE CONTENTS</b>
<b>WEEK – 1 (3 Hours)</b>	<b>MODULE-1: SolidWorks Basics and the User Interface</b> <ul style="list-style-type: none"> <li>• Design Intent</li> <li>• File References</li> <li>• Opening Files</li> <li>• The SolidWorks User Interface</li> <li>• Using the Command Manager</li> </ul>
<b>WEEK – 2 (3 hours)</b>	<b>MODULE-2: Introduction to Sketching</b> <ul style="list-style-type: none"> <li>• The Sketcher Workbench</li> <li>• 2D Sketching</li> <li>• Saving Files</li> <li>• What are We Going to Sketch? Sketching</li> <li>• Sketch Entities</li> <li>• Basic Sketching</li> <li>• Rules That Govern Sketches</li> <li>• Design Intent Sketch Relations Dimensions Extrude</li> <li>• Sketching Guidelines</li> <li>• Tutorial and Exercise</li> </ul>
<b>WEEK – 3 (3 hours)</b>	<b>MODULE-3: Basic Part Modeling</b> <ul style="list-style-type: none"> <li>• Other Sketching Tools in the Sketcher Workbench- Drawing Ellipses, Drawing Elongated Holes, Drawing Keyhole Profiles,</li> <li>• Basic Modeling</li> <li>• Terminology</li> <li>• Choosing the Best Profile</li> <li>• Choosing the Sketch Plane Details of the Part</li> <li>• Boss Feature</li> <li>• Sketching on a Planar Face</li> <li>• Cut Feature</li> <li>• View Selector</li> <li>• Using the Hole Wizard</li> <li>• Filleting Editing Tools Detailing Basics Drawing Views Center Marks</li> <li>• Dimensioning</li> <li>• Changing Parameters</li> <li>• Tutorial and Exercise</li> </ul>
<b>WEEK – 4 (3 hours)</b>	<b>MODULE-4: Symmetry, Draft &amp; Patterning</b> <p><b>Symmetry and Draft</b></p> <ul style="list-style-type: none"> <li>• Constraining Sketches</li> <li>• Boss Feature with Draft Symmetry in the Sketch</li> </ul>



	<ul style="list-style-type: none"><li>• Sketching Inside the Model View Options</li><li>• Using Model Edges in a Sketch</li><li>• Creating Trimmed Sketch Geometry</li><li>• Creating Views of Assemblies</li></ul> <b>Patterning</b> <ul style="list-style-type: none"><li>• Why Use Patterns?</li><li>• <i>Linear Pattern Circular Patterns</i></li><li>• Reference Geometry Planes</li><li>• Mirror Patterns</li><li>• Using Pattern Seed Only</li><li>• Sketch Driven Patterns</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE-5: Revolved Features &amp; Shelling and Ribs</b> <b>Revolved Features</b> <ul style="list-style-type: none"><li>• Revolved Features</li><li>• Building the Rim</li><li>• Building the Spoke</li><li>• Edit Material</li><li>• Mass Properties</li><li>• File Properties</li><li>• SolidWorks Simulation Xpress</li><li>• Using SolidWorks Simulation Xpress</li><li>• The Simulation Xpress Interface</li></ul> <b>Shelling and Ribs</b> <ul style="list-style-type: none"><li>• Shelling and Ribs</li><li>• Analyzing and Adding Draft</li><li>• Other Options for Draft Shelling</li><li>• Ribs</li><li>• Full Round Fillets</li><li>• Thin Features</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE-6: Creating Dress-Up and Hole Features</b> <b>Editing: Repairs</b> <ul style="list-style-type: none"><li>• Part Editing</li><li>• Editing Topics</li><li>• Sketch Issues</li><li>• Freezing Features</li><li>• Fillet Xpert</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE-7: Editing Features of a Model</b> <ul style="list-style-type: none"><li>• Design Changes</li><li>• Part Editing</li><li>• Design Changes</li><li>• Information From a Model</li><li>• Rebuilding Tools</li><li>• Replace Sketch Entity</li></ul>





	<ul style="list-style-type: none"><li>• Sketch Contours</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK-8 (3 Hours)</b>	<b>MODULE-8: Working with the Drafting Workbench</b> <b>Using Drawings</b> <ul style="list-style-type: none"><li>• More about Making Drawings</li><li>• Section View</li><li>• Model Views</li><li>• Broken View Detail Views</li><li>• Drawing Sheets and Sheet Formats</li><li>• Projected Views</li><li>• Annotations</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK-9 (3 Hours)</b>	<b>MODULE-9: Assembly Modeling</b> <ul style="list-style-type: none"><li>• Bottom-Up Assembly Modeling</li><li>• Creating a New Assembly</li><li>• Position of the First Component</li><li>• Feature Manager</li><li>• Design Tree and Symbols</li><li>• Adding Components</li><li>• Mating Components</li><li>• Using Part Configurations in assemblies</li><li>• Sub-assemblies</li><li>• Smart Mates</li><li>• Inserting Sub-assemblies</li><li>• Pack and Go</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK-10 (3 Hours)</b>	<b>MODULE-10: Working with Assembly &amp; Assembly Drawings</b> <ul style="list-style-type: none"><li>• Using Assemblies</li><li>• Analyzing the Assemblies</li><li>• Checking for Clearances</li><li>• Changing the values of Dimensions</li><li>• Exploded Assemblies</li><li>• Exploded Assemblies</li><li>• Explode Line Sketch</li><li>• Bill of Materials</li><li>• Assembly Drawing</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK – 11 (2 Hours)</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

**2.6.3 COURSE TITLE: 3D Printing Technology (COURSE CODE: AOC-DEP-ME-TDP)**



**1. COURSE DESCRIPTION:-** 3D Printing and Part Design is a range of courses designed to deliver basic product development education and strategies in an accelerated package. At the same time, this program will provide students with an opportunity to prototype their own product and designs. Key to the applied nature of the program, instructor guided build lab time will provide an arena to experience firsthand the exciting prototyping process. Harnessing the growing trend of 3D printing equipment in the product design process, this program will provide the student with professional-level prototyping experience. There will be a balanced focus on both 3D CAD designing utilizing the latest 3D modeling software, as well as hands-on fabrication and assembly training.

3D Printing is a method of creation that requires computer skills. This course will allow students to discover the potential of 3D printing. This course is an excellent option for anyone who ever wanted to prototype an invention, create a work of art, customize a product. Students may enroll for the course which will spread over minimum 30 hrs in a semester. Industries and institutions are fast adopting 3D Printing. They employ engineers and designers with 3D printing training as prototype and product engineers. 3D Printing experts are employed in design houses that provide 3D design, 3D computer-aided design (CAD) modeling, biological and scientific modeling.

Technology has gained great popularity in the past years but what surprises us the most is the level of innovation that has shaped the present of ours. The recent technologies have grown so well that it can now create 3D images without any hassle. However, the technology is not restricted to that application alone. With the rise of 3D printing service, one can now print images into 3D and create a prototype for study. A 3D printer essentially prints various layers of a product based on its 3D image, which is sliced layer by layer into the software itself. This is then reformatted and structured accordingly to recreate the image into real-time prototypes.

Any 3D printing service is designed to create the image and the prototype product, which on the later stage becomes very beneficial to the end users. 3D printing offers a wide range of advantages as compared to the traditional style of manufacturing prototypes. One of the benefits is that it reduces the time behind manufacturing. Since the printing technique incorporates high accuracy and precision, the requirement for finishing becomes obsolete. In addition to timesaving, the method is very much cost-effective and can be applied to applications across industries.

Since 3D printing service reduces the time and effort of the manufacturer to create a prototype, much more emphasis can be done on the research and design of a product. The manufacturers can invest their time in making a flawless product as the production cycle time is reduced. Different tests can be conducted on the prototype before the actual product is manufactured. 3D printing leads to a reduction of wastes and thus, there is no requirement of reducing, reusing, and recycling the waste materials every now and then. Moreover, many industries like and others who use critical components that require testing can use this 3D printing technology to create a working prototype of the component. Due to the high degree of accuracy and precision, one can print even the slightest of variations neatly. Therefore, these are the ways that it can benefit the industry that ultimately benefits society by either producing quality products or reducing the price of the products or both.

### **Why 3 D Printing :**

3D printing is useful to architects for creating mock-ups and to mechanics for creating tools. 3D printing is an innovation which fuels more innovation.



3D printing is inexpensive prosthetics, creating spare parts, rapid prototyping, creating personalized items and manufacturing with minimum waste.

A 3D printers can also be the basis of significant economizing in manufacturing plants. Bosch uses Zortrax 3D printers in its plant to create spare parts for machines as well as solutions which facilitate work.

3D printing is becoming indispensable in R&D departments and design departments.

### Career Prospects:

3D Printing is a manufacturing technology that is much faster than all conventional manufacturing technologies. As a result, the immediate market with significant value are the manufacturing SMEs as they require 3D Printing and Digital Fabrication technologies to make what they need. Additionally, the Make in India mission has many advantages for manufacturing companies.

## 2. Course Objectives

- Knowledge:
- To understand the fundamental concepts of Additive Manufacturing (i.e. Rapid Prototyping) and 3D printing, Its advantages & Limitations
- To classify various types of Additive Manufacturing Processes and know their working principle, advantages, limitations etc.
- To have a holistic view of various applications of these technologies in relevant fields such as mechanical, Bio-mechanical, aerospace, electronics etc.
- To have basic knowledge of Software's used for slicing and working by FDM type 3D printing machine.

### 3. COURSE OUTCOMES: After successful completion of this course students will be able to

S. No.	Course Outcomes
CO1	Demonstrate appropriate level of understanding on principles of additive manufacturing processes.
CO2	identify appropriate materials for additive manufacturing processes
CO3	Apply suitable CAD tools and CAD interface for additive manufacturing process
CO4	Develop physical prototypes by identifying suitable process with optimum process parameters

## 4. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	-	-	-	3	-	-	-	-	-	-	2	-	3	2
CO 2	2	-	-	-	3	-	-	-	-	-	-	2	-	3	2
CO	-	3	-	-	3	-	-	-	-	-	-	2	-	3	2



3															
CO 4	-	-	-	3	3	-	-	-	-	-	-	2	-	3	2

**5. COURSE PRE-REQUISITES:**

- Computer Aided Design & Drafting
- Engineering Materials

**6. ENROLMENT CRITERIA: Interested Students of IV Year (7<sup>th</sup> Semester)****7. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2****Criteria 1: 80% Attendance, and****Criteria 2: 70% or above marks in Certification Exam****8. WEEK-WISE COURSE OUTLINE:**

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1</b> <b>(3 Hours)</b>	<b>MODULE-1: Introduction to Additive Manufacturing</b> <ul style="list-style-type: none"> <li>• Introduction to layered manufacturing,</li> <li>• Importance of Additive Manufacturing Additive Manufacturing in Product Development</li> <li>• Classification of additive manufacturing processes,</li> <li>• Common additive manufacturing technologies; Fused Deposition Modeling(FDM), Selective Laser Sintering(SLS), Stereo Lithography(SLA), Selection Laser Melting (SLM), Jetting, 3D Printing, Laser Engineering Net Shaping (LENS), Laminated Object Manufacturing (LOM), Electron Beam Melting (EBM) Capabilities, materials, costs, advantages and limitations of different systems.</li> </ul>
<b>WEEK – 2</b> <b>(3 hours)</b>	<b>MODULE-2: Material science for additive manufacturing</b> <ul style="list-style-type: none"> <li>• Mechanisms of material consolidation-FDM, SLS, SLM, 3D printing and jetting technologies.</li> <li>• Polymers coalescence and sintering,</li> <li>• photo polymerization, solidification rates, Meso and macro structures,</li> <li>• Process evaluation: process-structure relationships, structure property relationships,</li> </ul>
<b>WEEK – 3</b> <b>(3 hours)</b>	<b>MODULE-3: Material science for additive manufacturing</b> <ul style="list-style-type: none"> <li>• Applications: Prototyping, Industrial tooling, Aerospace, Automobile, Medical etc.,</li> <li>• Quality control and reliability: Defects in FDM, SLS and SLM, Critical process parameters: geometry, temperature, composition, phase transformation,</li> <li>• Numerical and experimental evaluation: roles of process parameter combination, process optimization.</li> </ul>
<b>WEEK – 4</b> <b>(3 hours)</b>	<b>MODULE-4: CAD Modelling for 3D printing:</b> <ul style="list-style-type: none"> <li>• 3D Scanning and digitization,</li> <li>• data handling &amp; reduction Methods, AM Software: data formats and standardization,</li> <li>• Slicing algorithms:-uniform flat layer slicing, adaptive slicing,</li> </ul>



	<ul style="list-style-type: none"><li>• Process-path generation: Process-path algorithms, rasterisation, part Orientation and support generation.</li></ul>
<b>WEEK – 5</b> <b>(3 hours)</b>	<b>MODULE-5: Slicing with different parameters</b> <ul style="list-style-type: none"><li>• Modelling by using 3D software</li><li>• Conversion to STL File</li><li>• Different file Formats</li><li>• Export/ Import geometries</li><li>• Slicing by Using Simplify 3D</li><li>• Slicing difference with other software's like CURA.</li><li>• Effect of parameters on Slicing.</li><li>• Optimizing the parameters according to use.</li></ul>
<b>WEEK – 6</b> <b>(3 hours)</b>	<b>MODULE-6: Practice Session for Slicing with different parameters</b> <ul style="list-style-type: none"><li>• Export/ Import geometries</li><li>• Slicing by Using Simplify 3D</li><li>• Optimizing the parameters.</li><li>• Synchronizing with the machine parameters</li><li>• Know about the 3D printing machines &amp; Its specifications</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK- 7</b> <b>(3 Hours)</b>	<b>MODULE-7: Fusion Deposition Method- 3D printing</b> <ul style="list-style-type: none"><li>• Revolved Features</li><li>• Know about the Machine</li><li>• Working Process of Machine</li><li>• Safety measures</li><li>• Maintenance</li><li>• Sample files 3D printing</li><li>• Pre-processing &amp; Settings</li><li>• Post Processing &amp; Settings</li><li>• Handling of the Machine</li></ul>
<b>WEEK- 8</b> <b>(3 Hours)</b>	<b>MODULE-8: Creating 3D models by 3D printer-I</b> <ul style="list-style-type: none"><li>• Importing 3D model in STL file</li><li>• Slicing</li><li>• Preparing the machine</li><li>• Printing</li><li>• Post processing</li><li>• Analysis</li><li>• Tutorial and Exercise</li></ul>
<b>WEEK- 9</b> <b>(2 Hours)</b>	<b>MODULE-8: Creating 3D models by 3D printer-II</b> <ul style="list-style-type: none"><li>• Importing 3D model in STL file</li><li>• Slicing</li><li>• Preparing the machine</li><li>• Printing</li><li>• Post processing</li><li>• Analysis</li><li>• Tutorial and Exercise</li></ul>



<b>WEEK-10</b> <b>(2 Hours)</b>	<b>MODULE-10: Maintenance of Machine</b> <ul style="list-style-type: none"> <li>• How to clean the Working Area</li> <li>• Nozzle Cleaning</li> <li>• Inserting new Spooler</li> <li>• Lubrication to moving parts</li> <li>• Checking of electric components</li> </ul>
<b>WEEK – 11</b> <b>(2 Hours)</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

#### 2.6.4 COURSE TITLE: Basics of Automobile Engineering (COURSE CODE: AOC-DEP-ME-BAE)

**1. COURSE DESCRIPTION:** Automobile engineering is a branch that deals with the designs, manufacture, as well as operation of mechanical mechanisms of automobiles. It is also an introduction to vehicle engineering, which includes cars, motorcycles, trucks & buses, etc. Automobile engineering has gained recognition & importance ever since motor vehicles capable of carrying passengers have been in vogue. Now due to the rapid development of auto component manufacturers and automobile industries, automobile engineers are in great demand. This includes understanding the vehicle chassis, the mechanism of the internal combustion engine. Automobile Engineer is mainly classified into three-stream, namely Product or Design Engineers, Development Engineers & Manufacturing Engineers.

#### 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	Explain the working of different parts of an automobile.
CO2	Apply the knowledge of engine, transmission, clutch and brakes for smooth functioning of vehicles
CO3	Analyze the study of an angle for steering and the suspension systems.
CO4	Design and develop a strong base for understanding future developments in the automobile industry.
CO1	Explain the working of different parts of an automobile.

#### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	2	-	2	3
CO2	3	-	-	-	-	-	-	-	-	-	-	2	-	2	3
CO3	-	2	-	-	-	-	-	-	-	-	-	2	-	2	3
CO4	-	3	-	-	-	-	-	-	-	-	-	2	-	2	3

**4. COURSE PRE-REQUISITES:**

The first and foremost requirement to become an Automobile Engineer is “passion and interest” in cars and other automotive products. Students should also have an aptitude for resolving mechanical problems. Creativity and innovative solutions in drawing, designing and repairs are few essential skill-sets for this course.

**5. ENROLMENT CRITERIA:** Interested Students of I Year and II Year (All Branches)

**6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2**

**Criteria 1: 80% Attendance, and**

**Criteria 2: 70% or above marks in Certification Exam**

**7. WEEK-WISE COURSE OUTLINE:**

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1</b> <b>(3 Hours)</b>	<b>MODULE – 1: An Introduction of Automobile Engineering</b> <ul style="list-style-type: none"> <li>• What is Automobile?</li> <li>• Types of Automobile</li> <li>• Vehicle Construction And Components</li> <li>• Components of Engine</li> </ul>
<b>WEEK – 2</b> <b>(3 hours)</b>	<b>MODULE – 2: IC Engine</b> <ul style="list-style-type: none"> <li>• Types of I.C Engines</li> <li>• 2- Stroke Engines</li> <li>• 4 Stroke Engines</li> <li>• CVT Engines</li> </ul>
<b>WEEK – 3</b> <b>(3 hours)</b>	<b>MODULE – 3: New Technology in Automobile Engines</b> <ul style="list-style-type: none"> <li>• Automobile New Technologies in 2021.</li> <li>• CRDI Engines</li> <li>• MPFI Engines</li> <li>• S.I Engines</li> <li>• C.I Engines</li> </ul>
<b>WEEK – 4</b> <b>(3 hours)</b>	<b>MODULE – 3: Layout of Automobile</b> <ul style="list-style-type: none"> <li>• Frame &amp; Body</li> <li>• Clutches</li> <li>• Brakes</li> <li>• Gear Boxes</li> <li>• Drives</li> </ul>
<b>WEEK – 5</b> <b>(3 hours)</b>	<b>MODULE – 4: Steering and Suspension Systems</b> <ul style="list-style-type: none"> <li>• Wheels and Tyres</li> <li>• Steering system</li> <li>• Suspension system</li> <li>• Fuel System</li> </ul>





<b>WEEK – 6 (3 hours)</b>	<b>MODULE –6: Automobile Engine Servicing-I</b> <ul style="list-style-type: none"> <li>● Checking Engine Compression</li> <li>● Checking Engine Vacuum</li> <li>● Removing Timing Chain</li> <li>● Dismantling cylinder head</li> </ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE –7: Automobile Engine Servicing -II</b> <ul style="list-style-type: none"> <li>● Decarbonizing</li> <li>● Testing valve, valve seat and valve guide</li> <li>● Reassembling cylinder head</li> <li>● Adjusting valve clearance</li> </ul>
<b>WEEK - 8</b>	<b>MODULE-8: Dismantling and Assembly of Two Wheelers</b> <ul style="list-style-type: none"> <li>● Dismantling and Assembling Bajaj Pulsar DTSI Engine</li> <li>● Dismantling and Assembling TVS Apache RTR Engine</li> <li>● Dismantling and Assembling Honda Activa CVT Engine</li> </ul>
<b>WEEK - 9</b>	<b>MODULE-9: Dismantling and Assembly of Four Wheelers</b> <ul style="list-style-type: none"> <li>● Dismantling and Assembling Maruti Suzuki Petrol Engine</li> <li>● Dismantling and Assembling Maruti Suzuki Car Transmission</li> </ul>
<b>WEEK - 10</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

### 2.6.5 COURSE TITLE: Advances of Automobile Engineering (COURSE CODE: AOC-DEP-ME-AAE)

- COURSE DESCRIPTION:** Automobile engineering is a branch that deals with the designs, manufacture, as well as operation of mechanical mechanism of automobiles. Now a days HEV system introduce the latest trends in field of an automobile engineering. A hybrid electric vehicle (HEV) is a type of hybrid vehicle that combines a conventional internal combustion engine (ICE) system with an electric propulsion system (hybrid vehicle drivetrain). The presence of the electric powertrain is intended to achieve either better fuel economy than a conventional vehicle or better performance. There is a variety of HEV types and the degree to which each function as an electric vehicle (EV) also varies. The most common form of HEV is the hybrid electric car, although hybrid electric trucks (pickups and tractors), buses, boats and aircraft also exist.

#### 2. Course Outcomes:

S.No.	Course Outcomes
CO1	Explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals for the exhaust & features.
CO2	Apply the knowledge of ignition and lighting system for the working of an automobile systems.



CO3	Analyze the use of different power converters and electrical system in hybrid electric vehicles.
CO4	Create a strong base of HEV for understanding the future developments in the HEV.

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	2	-	2	3
CO2	3	-	-	-	-	-	-	-	-	-	-	2	-	2	3
CO3	-	2	-	-	-	-	-	-	-	-	-	2	-	2	3
CO4	-	3	-	-	-	-	-	-	-	-	-	2	-	2	3

### 4. COURSE PRE-REQUISITES:

The first and foremost requirement to become an Automobile Engineer is “passion and interest” in cars and other automotive products. Students should also have an aptitude for resolving mechanical problems. Creativity and innovative solutions in drawing, designing and repairs are few essential skill-sets for this course.

### 5. ENROLMENT CRITERIA: Interested Students of I Year and II Year (All Branches)

### 6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2

**Criteria 1: 80% Attendance, and**

**Criteria 2: 70% or above marks in Certification Exam**

### 7. WEEK-WISE COURSE OUTLINE:

WEEK	MODULE-WISE CONTENTS
<b>WEEK – 1</b> (3 Hours)	<b>MODULE – 1: Hybrid &amp; Electric Vehicle</b> <ul style="list-style-type: none"> <li>● Bs-6</li> <li>● Electrical Vehicles</li> <li>● Hybrid Vehicles</li> <li>● Hydrogen cars</li> <li>● Fuel Cell Cars</li> </ul>
<b>WEEK – 2</b> (3 hours)	<b>MODULE – 2: Exhaust System</b> <ul style="list-style-type: none"> <li>● Testing Exhaust Smoke</li> <li>● Cleaning Secondary Air Injection System</li> <li>● Silencer Cleaning in 2stroke Engine Vehicles</li> </ul>
<b>WEEK – 3</b> (3 hours)	<b>MODULE – 3: AC System &amp; Safety Feature</b> <ul style="list-style-type: none"> <li>● Turbochargers</li> <li>● A.C Systems</li> <li>● Air Bag Systems</li> <li>● Car Scanning's</li> <li>● NVS (Night Vision System)</li> <li>● GPS (Global Positioning System)</li> </ul>



<b>WEEK – 4 (3 hours)</b>	<b>MODULE – 4: Electrical System</b> <ul style="list-style-type: none"> <li>Battery Type &amp; Construction</li> <li>Battery Charging, Testing and Starting</li> </ul>
<b>WEEK – 5 (3 hours)</b>	<b>MODULE – 5: Ignition &amp; Lighting System</b> <ul style="list-style-type: none"> <li>Magneto and Coil Ignition Systems</li> <li>Automotive lighting</li> <li>Wiring Systems</li> <li>Electrical instrument</li> </ul>
<b>WEEK – 6 (3 hours)</b>	<b>MODULE – 6: Demonstration of Technologies in Vehicles</b> <ul style="list-style-type: none"> <li>Demonstration of Mercedes C Class Car Technologies</li> <li>Demonstration of BMW 5 Series Car Technologies</li> <li>Demonstration of Electric Car Technologies</li> </ul>
<b>WEEK-7 (3 Hours)</b>	<b>MODULE –7: Dismantling and Assembly of Engines-I</b> <ul style="list-style-type: none"> <li>Dismantling of Honda City I-V Tech 16 Valves New Engine</li> <li>Assembling of Honda City I-V Tech 16 Valves New Engine</li> </ul>
<b>WEEK - 8</b>	<b>MODULE –8: Dismantling and Assembly of Engines-II</b> <ul style="list-style-type: none"> <li>Dismantling of Mercedes Benz CDI Engine</li> <li>Assembling of Mercedes Benz CDI Engine</li> </ul>
<b>WEEK - 9</b>	<b>MODULE-9: Dismantling and Assembly of Engines-III</b> <ul style="list-style-type: none"> <li>Dismantling and Assembling Honda Accord V-6 Engine</li> <li>Dismantling and Assembling AUDI/BMW/Mercedes Automatic Transmission</li> </ul>
<b>WEEK - 10</b>	<b>1. CERTIFICATION EXAMINATION</b> <b>2. CLOSING AND VALEDICTORY CEREMONY</b>

## 2.7 DEPARTMENT OF FIRST YEAR

S. No.	Course ID	Course Name	No. of Modules	Course Duration	Course Facilitator
1	AOC-DEP-FY-PBL	Project Based Learnings	8	32 Hours	Mr. Abhishek Singh



2	AOC-DEP-FY-LRTS	Program on Logical Reasoning and Technical Skill Development	20	60 Hours	Mr. Kuldeep Sharma
3	AOC-DEP-FY-SDPP	Skill Development Program in Project Oriented Training	10	30 Hours	Dr. Ratnesh Kumar Sharma
4	AOC-DEP-FY-ACP	Skill Development Program in Advanced C	10	30 Hours	Mr. Jay Prakash Singh
5	AOC-DEP-FY-SDPML	Skill Development Program in Machine Learning-Deep learning	10	30 Hours	Ms. Shivani Saxena
6	AOC-DEP-FY-SDPWD	Skill Development Program in Web Development using JAVASCRIPT and REACTJS	10	30 Hours	Mr. Bhagirath Singh

### 2.7.1 COURSE TITLE: Project Based Learnings (COURSE CODE: AOC-DEP-FY-PBL)

**1. COURSE DESCRIPTION:** With respect to 'Project based Learning' for the students of Poornima College of Engineering, B. Tech. (1- year), Poornima College of Engineering offers Program on Technical and skill development 'to upgrade the knowledge and technical skills of the students to prepare them for various industrial requirements.

#### 2. Course Outcomes:

- **CO 1:** students will be able to have knowledge about various electronics components
- **CO 2:** Students will be able to analyze selection of sensors and motors
- **CO 3:** Students will be able to develop their software collaborating with hardware programming skills.
- **CO 4:** Students will be able to Design various types of Real world projects

#### 3. MAPPING COURSE OUTCOMES WITH POs:

Mapping for Course Outcomes with Program Outcomes.

(3/2/1 indicates strength of correlation, 3-Strong, 2-Medium, 1-weak)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	-	-	-	2	-	-	-	-	-	-	-
CO-2	-	3	-	-	2	-	-	-	-	-	-	1



CO-3	2	-	-	-	-	-	-	2	2	-	-	3
CO-4	3	3	-	2	3	1	1	-	2	-	-	3
Avg.	2	1.5	-	0.5	1.75	0.25	0.25	0.5	1	-	-	1.75

#### 4. Pre-requisites of the course:

Participant must be a student of B. Tech. 1<sup>st</sup> year at Poornima college of Engineering.

#### 5. Enrollment Criteria

Participant must be a student of B. Tech. 1<sup>st</sup> year at Poornima College of Engineering.

#### 6. Evaluation Criteria:

- QUIZ
- Project demonstrations

#### 7. Certification Criteria:

(i) 75% attendance (ii) At least 50% marks in quiz.

#### 8. Course Content with week-wise planning:

Week 1	Introduction
	History of Electrical and Electronic Component
	Various Electrical and Electronic Components
	How to use Electrical and Electronic Components
Week 2	Introduction of nodemcu
	History of nodemcu
	Types of nodemcu
	Selection of nodemcu
Week 3	ESP8266,ESP32 Specifics
	Setting up the Arduino IDE for using the ESP8266 , ESP32
	Network protocols
	Setting up a Wi-Fi connection
Week 4	Setting up a simple web server
	Wirelessly controlling your RGB lighting
	Development boards with a USB interface
	Basics of making a HyperText Transfer Protocol (HTTP) request
Week 5	Introduction of Sensor



	Various Basic Industrial Sensors-IR- Analog Sensor
	IR Digital Sensor Color IR _TSOP Sensor , Light Sensor , Sound Sensor , DTMF Module
	Basic working Technique of Sensor
Week 6	Introduction of Electrical Machine
	DC Motor
	Stepper Motor
	Servo Motor
Week 7	Various programming Languages
	Selection of programming Language
	Need of Flow Diagram
	How to write First "LEDBLINKING" Code in Embedded C
Week 8	Intelligent home locking system.
	Intelligent water level management system.
	Home automation using RFID.
	Real time clock-based home automation.
	Intelligent Automatic Irrigation System

### 2.7.2 COURSE TITLE: Program on Logical Reasoning and Technical Skill Development (COURSE CODE: AOC-DEP-FY-LRTS)

**1. COURSE DESCRIPTION:** With respect to Technical Training Program for the students of Poornima College of Engineering, B. Tech. (1<sup>st</sup> year, Poornima College of Engineering offers' Program on logical reasoning and skill development 'to upgrade the aptitude, knowledge and soft skills of the students to develop their personality and prepare them for various competitive examinations.

#### 2. COURSE OUTCOMES:

- **CO 1:** Students will be able to have knowledge about number system, quadratic equation, percentage, simple interest, compound interest, probability, permutation - combination and Vedic mathematics.
- **CO 2:** Students will be able to analyze the problems related to syllogism, patterns, puzzles and solve them.
- **CO 3:** Students will be able to develop their soft skills like communication skill (both speaking skill and writing skill). They will study about basic rules of English grammar to improve their communication.



- **CO 4** : Students will be able to improve their reasoning and logical thinking and also apply short cut tricks to solve the problems fast.
- **CO5**: Students will be able to interpret the data and evaluate the outcomes based on it.

### 3. MAPPING COURSE OUTCOMES WITH POs:

Mapping for Course Outcomes with Program Outcomes.

(3/2/1 indicates strength of correlation, 3-Strong, 2-Medium, 1-weak)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	2	-	-	-	-	-	-	-	-	-	-
CO-2	-	3	-	-	-	-	-	-	-	-	-	-
CO-3	-	-	-	-	-	-	-	2	2	3	-	3
CO-4	-	-	-	2	-	-	-	-	-	-	-	3
CO-5		3										2
Avg.	0.6	1.6	-	0.4	-	-	-	0.4	0.4	0.6	-	1.6

### 4. Pre-requisites of the course:

Participant must be a student of B. Tech. 1<sup>st</sup> year at Poornima college of Engineering.

### 5. Enrollment Criteria:

Participant must be a student of B. Tech. 1<sup>st</sup> year at Poornima College of Engineering.

### 6. Evaluation Criteria:

Quiz

### 7. Certification Criteria:

(i) 75% attendance (ii) At least 50% marks in quiz.

### 8. Course Content with week-wise planning :

9.

Week 1 (Module 1)	Awareness about different Competitive Exams SWOT Analysis: Self Awareness,
Week 2 (Module 2)	Basic Calculation & Simplification: Addition & Subtraction, Divisible & Multiplication, Square & Cube root
Week 3 (Module 3)	Ice Breaking Session: Self- Introduction, Team Building and Group Dynamics, Vocabulary Building
Week 4 (Module 4)	Number System: Numbers, HCF & LCM, Cyclicity, Algebraic Formulae
Week 5	Public Speaking, Word & Sentence Formation, Basic Usage of Grammar, Environmental Awareness





(Module 5)	
Week 6 (Module 6)	Ratio & Proportion: Types & Problems
Week 7 (Module 7)	Time Management & Goal Setting, Stress Management, Assertiveness
Week 8 (Module 8)	Creative & Analytical skills, Language Skills, Basic Usage of Grammar
Week 9 (Module 9)	Percentage & Partnership: Explanation & Conditions
Week 10 (Module 10)	Social & Business Etiquettes- Dealing in Social & Business Environment
Week 11 (Module 11)	Profit & Loss: Basic Formulae & Problems
Week 12 (Module 12)	Time & Work: Conditions, Pipes & Cisterns, Concept of Efficiency, Problems
Week 13 (Module 13)	Letter Writing, Business Comm. E-mail Etiquettes, Telephonic Etiquettes
Week 14 (Module 14)	Inter & Intra Personal Skills, Group Communication
Week 15 (Module 15)	Leadership Skills, Pro-activeness, News Paper Reading
Week 16 (Module 16)	Time, Speed & Distance: Units of Measurements, Cases or Conditions, Boat and Streams, Problems
Week 17 (Module 17)	Listening with Understanding, Memory Enhancement, Resume & CV Writing
Week 18 (Module 18)	Video/ Case Study Analysis, Article/Film/Book Review
Week 19 (Module 19)	Logistics: Analogy, Coding/ decoding, Venn Diagrams, Seating Arrangements, Syllogism
Week 20 (Module 20)	Interview Skills, Personal Grooming



### 2.7.3 COURSE TITLE: Skill Development Program in Project Oriented Training (COURSE CODE: AOC-DEP-FY-SDPP)

**1. COURSE DESCRIPTION:** The main objective of the program is to enhance the skill of students to apply the technical concept into real life to develop the society with the application of modern engineering tools. This program is a multi-dimensional learning experience and gives a student an edge over competitors. The programs give a varied experience and exposure to every student in various activities.

#### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Understand the knowledge of basic machine tools related to the electrical as well as mechanical engineering.
CO2	Apply the knowledge of some engineering software like EAGLE and Auto CAD in the industrial field by making some capstan projects.
CO3	Analyze some basic problems in the field of electrical as well as mechanical engineering with the help of some advanced engineering tools and softwares for example Auto Cad, EAGLE, Basic Machine Tools and SMD Components.
CO4	Evaluate themselves by working on some basic and fundamental projects with the help of some advanced engineering tools and softwares like Auto Cad, EAGLE, Basic Machine Tools, and SMD Components.
CO5	Design & create some basic projects of ROBO Car with the help of some advanced engineering tools and softwares like Auto Cad, EAGLE, Basic Machine Tools, and SMD Components.

#### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	-	3	-	-	-	-	-	-	-	-	-

#### 4. COURSE PRE-REQUISITES:

Students should already be comfortable using the operating system Windows on which they will be running Software AutoCAD and EAGLE CAD.

#### 5. ENROLMENT CRITERIA: Interested Students of I Year (All Branches)

#### 6. CERTIFICATION CRITERIA: Mandatory Fulfillment of Criteria 1 and 2

**Criteria 1: 80% Attendance, and**

**Criteria 2: 60% or above marks in Certification Exam**

**7. WEEK-WISE COURSE OUTLINE:**

Days/Time		
<b>Day 1</b>	<b>Basic introduction of electrical and Mechanical component</b> <ul style="list-style-type: none"> <li>Resistance</li> <li>Capacitance</li> <li>multi meter</li> <li>CRO</li> <li>Breadboard</li> </ul>	<b>Introduction of SMD component and Machine Tools</b> <ul style="list-style-type: none"> <li>Drilling operation</li> <li>Soldering</li> <li>Cutting tools</li> <li>Filling</li> </ul>
<b>Day 2</b>	<b>Software introduction (CAD)</b> Software Interfacing with Basic drawing commands	<b>Software introduction (CAD)</b> <ul style="list-style-type: none"> <li>Basic Drawing by using Draw tool bar</li> <li>Editing Commands</li> </ul>
<b>Day 3</b>	<b>Software introduction (CAD)</b> <ul style="list-style-type: none"> <li>Editing Commands</li> </ul>	<b>Software introduction (CAD)</b> <ul style="list-style-type: none"> <li>Hands on Practice by creating basic drawings</li> </ul>
<b>Day 4</b>	<b>Detailed procedure of Schematic design on Design software (CAD)</b> <ul style="list-style-type: none"> <li>Introduction to modify tool bar</li> <li>Making changes in drawing</li> <li>Making drawings more precise</li> </ul>	<b>Detailed procedure of Schematic design on Design software (CAD)</b> Dimensioning Setting of drawing in layout
<b>Day 5</b>	<b>Detailed procedure of Schematic design on Design software (CAD)</b> <ul style="list-style-type: none"> <li>Circuit design on CAD</li> <li>Printing your drawing</li> </ul>	<b>Detailed procedure of Schematic design on Design software (CAD)</b> <ul style="list-style-type: none"> <li>Hands on Practice creating standard drawings</li> </ul>
<b>Day 6</b>	<b>Detailed procedure of Schematic design on Design software (CAD)</b> <ul style="list-style-type: none"> <li>Designing of robo car on software</li> </ul>	<b>Detailed procedure of Schematic design on Design software (CAD)</b> <ul style="list-style-type: none"> <li>Printing and detailing of robo car</li> </ul>
<b>Day 7</b>	<b>Software introduction (EAGLE)</b> <ul style="list-style-type: none"> <li>Detailing about the EAGLE</li> </ul>	<b>Software introduction (EAGLE)</b> <ul style="list-style-type: none"> <li>Circuit design on EAGLE</li> <li>Making drawings more precise</li> </ul>
<b>Day 8</b>	<ul style="list-style-type: none"> <li>Design circuit on bread board</li> <li>Design layout of circuit on software</li> <li>Board layout design</li> </ul>	<ul style="list-style-type: none"> <li>Create the schematic.</li> <li>Create a blank PCB layout.</li> <li>Schematic capture: linking to PCB.</li> <li>Designing PCB stack up.</li> </ul>



<b>Day 9</b>	<b>Start PCB Design</b> <ul style="list-style-type: none"> <li>Defining design rules and DFM requirements.</li> <li>Place components.</li> <li>Insert drill holes.</li> <li>Route Traces.</li> </ul>	<ul style="list-style-type: none"> <li><b>Tasting of circuit</b></li> <li><b>Expert talk by:</b> <b>Dr. Bhavesh Vyas</b>, Department of Electrical and Electronics Engineering, K R Mangalam University, Gurugram</li> </ul>
<b>Day 10</b>	<b>Hands on practices with mechanical and electrical components</b> <ul style="list-style-type: none"> <li>Cutting of board</li> <li>Pasting of board</li> </ul>	<b>Hands on practices with mechanical and electrical components</b> <ul style="list-style-type: none"> <li>Drilling</li> <li>Assembly of components</li> </ul>

#### 2.7.4 COURSE TITLE: Skill Development Program in Advanced C (COURSE CODE: AOC-DEP-FY-ACP)

**1. COURSE DESCRIPTION:** A 15 days C Language has been organized by PCE, JAIPUR for the enhancement of the skill of students. This program has been organized for the students to develop their skill and for sustainability of the students in the current competitive market.

#### 2. COURSE OUTCOMES:

S. No.	Course Outcomes
CO1	Understand the basic concepts of C programming
CO2	Design and develop various programming problems using C programming concepts.
CO3	Implement advance C programming concepts like function, pointer, structure, union and file handling.
CO4	Develop the project using concept of advance and data structure

#### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	3	2

#### 4. COURSE PRE-REQUISITES:

Students should already be comfortable using the operating system like Linux or Windows. While not mandatory, basic skills with at least one other programming language like C or C++ desirable.



**5. ENROLMENT CRITERIA: Interested Students of I Year (All Branches)**

**6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2**

**Criteria 1: 80% Attendance, and**

**Criteria 2: 60% or above marks in Certification Exam**

**7. WEEK-WISE COURSE OUTLINE:**

Day No./ Module	Topic
1.  Introduction to C Programming	Introduction to Linux and gcc
	C program execution steps
	C Tokens and Data Types
	Keywords, Variable, Identifiers and Constants
	Signed and Unsigned Concept
	Exceed the limit and MOD function
	Hands on practice on various types of programs.
2.  C Operators	Input/Output Functions
	Introduction to C operators
	Expression Evaluation
	Concept of short circuit in Logical Operator
	Bitwise Operators
	Misc Operators
	Operator Precedence and Associativity
	More about Bitwise Operators
3.  Control Statements	Hands on practice on various types of programs.
	Decision Making & Selection Statements
	If statement
	Switch case statement
	More about Switch case statement
	Decision Making and Looping
	Nested loop
	Jump Statements
4.  Function	Hands on practice on various types of programs.
	Function Introduction
	Storage Classes
	Static members
	Function and pointers
	Recursion and Call stack
	Multifile Program and Project File
	Hands on practice on various types of programs.
5.	Introduction to Array and Strings
	Variable length array



Array and String	Array of string
	Concept of sprintf and sscanf function
	Insertion and Deletion in an Array
	Hands on practice on various types of programs.
6. Pointers	Pointers and Dynamic Array
	Malloc, calloc, realloc and free function
	Chain of pointers
	Dangling pointer
	Concept of Void pointer
	Hands on practice on various types of programs.
7. Stack	Introduction of Stack Data Structure
	Array Representation of Stack
	Push, Pop, Peek Operations
	Hands on practice on various types of programs.
8. Queue	Introduction to Queue Data Structure
	Terminology used in Queue
	Insertion and deletion in Queue
	Introduction to Circular Queue
	Introduction to Priority Queue
	Hands on practice on various types of programs.
9. Structure	Introduction to Structure
	Structure padding and packing
	Passing structure as an argument
	Pointer to structure
	Introduction to Union
	Self referential structure
	Hands on practice on various types of programs.
10. Linked List	Introduction to Linked List
	Linked List representation
	Traversing, insertion, deletion and searching in Linked List
	Hands on practice on various types of programs.

**2.7.5 COURSE TITLE:** Skill Development Program in Machine Learning-Deep learning  
**(COURSE CODE: AOC-DEP-FY-SDPML)**

### 1. COURSE DESCRIPTION:



To develop skills of using and developing machine learning deep learning models. By the end of the program, students will be able to develop machine learning deep learning models and can analyze the results. Students will be able to optimize the neural networks.

## 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Understanding the fundamentals of Image Processing, Data Science, Python for Machine Learning and artificial intelligence (AI).
CO2	Apply basic principles of Machine Learning in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3	Analyzing basic machine learning algorithms.
CO4	Design solutions of real-world computational problems using ML and DL algorithms

## 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	-	-	3	-	-	-	-	-	-	-	-	3	-	-	-

## 4. COURSE PRE-REQUISITES:

Students should already be comfortable using the operating system like Linux or Windows on which they will be running Python or Google Colab. While not mandatory, basic skills with at least one other programming language like C, C++, Java are desirable.

## 5. ENROLMENT CRITERIA: Interested Students of I Year (All Branches)

## 6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2

Criteria 1: 75% Attendance, and

Criteria 2: 50% or above marks in Certification Exam

## 7. WEEK-WISE COURSE OUTLINE:

Days/Time		
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Day 1	<b>Introduction to Image Processing</b> <ul style="list-style-type: none"> <li>• Introduction to Image Processing</li> <li>• Application of Image Processing</li> <li>• <u>Fundamental Image Processing Steps</u></li> </ul>	<b>Image Processing Techniques</b> <ul style="list-style-type: none"> <li>• Image Acquisition</li> <li>• Image Preprocessing</li> <li>• Image Enhancement</li> <li>• Image Restoration</li> <li>• Morphological Processing</li> <li>• Image Segmentation</li> <li>• Object Recognition</li> <li>• Image Data Compression</li> </ul>
Day 2	<b>Introduction to Python</b> <ul style="list-style-type: none"> <li>• Variable Declaration</li> <li>• Data Types</li> <li>• Functions</li> </ul>	<ul style="list-style-type: none"> <li>• Loops</li> <li>• Conditional Programming</li> </ul>
Day 3	<b>Package Description for ML and Data Science</b> <ul style="list-style-type: none"> <li>• Numpy</li> <li>• Pandas</li> <li>• Matplotlib</li> <li>• Seaborn</li> </ul>	<b>Python Practice</b> <ul style="list-style-type: none"> <li>• Numpy</li> <li>• Scipy</li> <li>• Scikit-learn</li> <li>• Theano</li> </ul>
Day 4	<b>“Data Analytics Techniques, Applications and Use Cases”</b> <b>(Guest Lecture by Dr. Jagannath Singh, Associate Professor, KIIT Deemed to be University, Bhubaneswar)</b>	<b>Data Extraction &amp; Visualization</b> <ul style="list-style-type: none"> <li>• Define Data Science</li> <li>• Role of a Data Scientist</li> <li>• Data Acquisition techniques</li> <li>• Different types of Data</li> <li>• Evaluate Input Data</li> <li>• Data Extraction</li> <li>• Hands-On: - Loading different types of dataset in Python</li> </ul>
Day 5	<b>Introduction to Machine Learning</b> <ul style="list-style-type: none"> <li>• Need of Machine Learning</li> <li>• Introduction to Machine Learning</li> <li>• Types of Machine Learning, such as supervised, unsupervised and reinforcement learning</li> <li>• Why Machine Learning with Python and applications of Machine Learning.</li> </ul>	<b>Supervised Learning and Linear Regression</b> <ul style="list-style-type: none"> <li>• Introduction to supervised learning</li> <li>• Types of supervised learning - regression and classification</li> <li>• Introduction to regression</li> <li>• Simple linear regression</li> <li>• Multiple linear regression,</li> <li>• Assumptions in linear regression, and math behind linear regression</li> </ul>
Day 6	<b>Classification based Learning</b> <ul style="list-style-type: none"> <li>• Introduction to classification</li> <li>• Linear regression vs logistic regression</li> </ul>	<ul style="list-style-type: none"> <li>• Threshold evaluation with ROC.</li> <li>• Hands-on Exercise – Logistic regression, Confusion matrix Implementation</li> </ul>



	<ul style="list-style-type: none"> <li>• Confusion matrix and accuracy</li> <li>• True positive rate v/s false positive rate</li> </ul>	
Day 7	SPL	<b>Unsupervised Learning</b> <ul style="list-style-type: none"> <li>• Types of unsupervised learning</li> <li>• Clustering and dimensionality reduction</li> <li>• Types of clustering</li> <li>• Introduction to k-means clustering</li> </ul>
Day 8	<b>Introduction to Deep Learning</b> <ul style="list-style-type: none"> <li>• Introduction to Deep Learning with neural networks</li> <li>• Biological neural network vs artificial neural network</li> <li>• Understanding perceptron learning algorithm</li> <li>• Introduction to Deep Learning frameworks</li> <li>• Tensor Flow constants</li> <li>• Variables and place-holders.</li> </ul>	<b>“Evaluation Parameters for Classifiers”</b> <b>(Guest Lecture by Dr. Jitendra Kumar Rout, Assistant Professor II, NIT-Raipur, Chhatisgarh)</b>
Day 9	SPL	<b>Artificial Neural Networks</b> <ul style="list-style-type: none"> <li>• Various methods that are used to train artificial neural networks</li> <li>• Perceptron learning rule</li> <li>• Gradient descent rule</li> <li>• Tuning the learning rate</li> <li>• Regularization techniques</li> <li>• Optimization techniques</li> <li>• Stochastic process</li> <li>• Vanishing gradients</li> <li>• Transfer learning</li> <li>• Dropout layer</li> <li>• Unsupervised pre-training</li> </ul>
Day 10	<b>Multi-layered Neural Networks</b> <ul style="list-style-type: none"> <li>• Multi-layer network introduction</li> <li>• Regularization</li> <li>• Deep neural networks</li> <li>• Multi-layer perceptron</li> </ul>	<ul style="list-style-type: none"> <li>• Overfitting and capacity</li> <li>• Neural network hyperparameters</li> <li>• Different activation functions used in neural networks: - ReLu, Softmax, Sigmoid, and hyperbolic functions,</li> </ul>



## 2.7.6 COURSE TITLE: Skill Development Program in Web Development using JAVASCRIPT and REACTJS (COURSE CODE: AOC-DEP-FY-SDPWD)

**1. COURSE DESCRIPTION:** Two weeks “Web Development Using JavaScript and ReactJS” has been organized by Poornima College of Engineering for the enhancement of the skill of students. This program has been organized for the students to develop their skill and for sustainability of the students in the current competitive market.

The skill development program has been initiated in “Web Development Using java Script and ReactJS”.

### 2. COURSE OUTCOMES:

S.No.	Course Outcomes
CO1	Understand the basic concepts of HTML, CSS and JavaScript.
CO2	Apply the concept of HTML, CSS, JavaScript for client-side scripts.
CO3	Analyze the significance of ReactJS client-side scripts.
CO4	Develop the Live Project using concept of JavaScript and ReactJS.

### 3. MAPPING COURSE OUTCOMES WITH PO AND PSO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	3

### 4. COURSE PRE-REQUISITES:

Students should already be comfortable using the operating system like Linux or Windows. While not mandatory, basic skills with at least one other programming language like C, C++, Java are desirable.

### 5. ENROLMENT CRITERIA: Interested Students of I Year and II Year (All Branches)

### 6. CERTIFICATION CRITERIA: Mandatory Fulfilment of Criteria 1 and 2

**Criteria 1: 75% Attendance, and**

**Criteria 2: 50% or above marks in Certification Exam**

### 7. WEEK-WISE COURSE OUTLINE:

Days/Time		
<b>Day 1</b>	Introduction to HTML5 Basic HTML Document Structure	Anatomy of an HTML Tag HTML Content Models Creating Links
<b>Day 2</b>	Build tables for even more HTML structure Create Forms with in depth form examples and HTML tag explanations	Add iframes and more cool HTML elements



<b>Day 3</b>	Create your own mini HTML site using only HTML	Create your own mini HTML site using only HTML
<b>Day 4</b>	<b>“Data Analytics Techniques, Applications and Use Cases”</b> (Guest Lecture by Dr. Jagannath Singh, Associate Professor, KIIT Deemed to be University, Bhubaneswar)	Guest Lecture
<b>Day 5</b>	<b>Guest Lecture</b>	Guest Lecture
<b>Day 6</b>	Power of CSS Anatomy of a CSS Rule	Element, Class, and ID Selectors Style Placement
<b>Day 7</b>	The Box Model The background Property	Responsive Design
<b>Day 8</b>	Introduction to Bootstrap The Bootstrap Grid System	CSS positioning Working with Hyperlinks and making it look good CSS Pseudo Class
<b>Day 9</b>	Adjusting Development Environment for Javascript Development Javascript Types	Common Language Constructs Creating Objects Functions
<b>Day 10</b>	Passing Variables by Value vs. by Reference Function Constructors, prototype, and the 'this' Keyword Array and Fake Namespaces	Immediately Invoked Function Expressions Conditions and Switches to apply logic Loops and iterating through data