ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY

ACCREDITED BY NAAC WITH 'A' Grade

PROGRAMME SCHEME & SYLLABI 2021 – 2022

B. Tech. (Artificial Intelligence)

- **About the department**

B. Tech. in **Artificial Intelligence** is an undergraduate programme that offers advanced learning solutions and emphasizes advanced innovations such as machine learning, also known as deep learning and artificial intelligence.

With a cutting-edge combination of machine learning, analytics, and visualization technologies, students will be able to construct intelligent machines, software, or applications. Artificial intelligence (AI) has as their major goal the programming of computers to solve problems using example data or experience. Many successful machine learning applications already exist, such as systems that analyse past sales data to predict customer behaviour (financial management), recognize faces or spoken speech, optimise robot behaviour to complete a task with minimal resources, and extract knowledge from bio informatics data.

This curriculum examines AI methods from several domains, such as neural networks, signal processing, Gaming, Data Analytics and data mining, in order to give a comprehensive examination of machine learning challenges and solutions.

- **Vision**

"To become a centre of excellence in the field of Artificial Intelligence, enabling students with a high level of technical and practical capabilities to address the needs of industry and society."

- **Mission**

- To develop skilled professionals in the field of artificial intelligence (AI).
- To provide high-quality, value-based education and to contribute to computing, expert systems, and data science innovation in order to increase the level of satisfaction among all stakeholders.
- Our goal is to use cutting-edge high-performance computing technology and software.

- **Program education objectives**

- **PEO 1:** Graduates will be able to create and solve difficult intelligent computing and multidisciplinary challenges using their analytical, decision-making, and prediction skills learned in AI.

- **PEO 2**: Graduates with an in-depth understanding of Artificial Intelligence will be able to pursue higher education, research, and development opportunities.
- **PEO 3:** Graduates will be able to demonstrate their employability skills and also practising professional ethics with a feeling of social responsibility.

- **Program outcomes**

PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 - Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 - The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 - Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 - Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and

write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 - Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 - Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

- **Program specific outcomes**
  - **PSO 1:** Apply a set of Artificial Intelligence principles, tools, and techniques to model, evaluate, and recommend a suitable solution to a variety of real-world business challenges by communicating important discoveries and successfully presenting results using appropriate data visualization approaches.
  - **PSO 2:** Apply Artificial Intelligence and Machine Learning skills in fields such as health care, education, agriculture, e-commerce, finance, smart systems, and multi-disciplinary AI.

Scheme (I Sem to VIII Sem)

ST. VINCENT PALLOTTI COLLEGE OF ENGIEERING & TECHNOLOGY, NAGPUR

TEACHING SCHEME- PROPOSED FOR AUTONOMY

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech) DEGREE COURSE

BRANCH: ARTIFICIAL INTELLIGENCE

ANNEXURE – I

ST VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY

Credit Structure for Undergraduate programs (Artificial Intelligence)

Sr. No	Category	Credits	AICTE Norms
1	Humanities, Social Sciences & Management courses	15	15
2	Basic Science courses	23	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	18	24
4	Professional core courses	57	48
5	Professional Elective courses relevant to chosen specialization/branch	20	18
6	Open subjects – Electives from other technical and /or emerging subjects	12/18	18
7	Project work, seminar and internship in industry or elsewhere	20/14	15
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]	0	0
9	Comprehensive Courses [Industry Training and Skill Development, Capstone Course]	4	0
	TOTAL	**Max - 169**	

ANNEXURE – I

Scheme of Examination of Bachelor of Technology

(Artificial Intelligence)

Semester Pattern

III Semester B. Tech. (Artificial Intelligence)

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Continual Assessment	End Sem Examination	Total
1	AS301T	Applied Mathematics – III	3	1	-	4	30	70	100
2	AI301T	Data Structure	4	-	-	4	30	70	100
3	AI301P	Data Structure Lab	-	-	2	1	25	25	50
4	AI302T	Fundamentals of Artificial Intelligence	3	1		4	30	70	100
5	AI302P	Fundamentals of Artificial Intelligence Python Lab	-	-	2	1	25	25	50
6	AI303T	Computer Networking	3	1	-	4	30	70	100
7	AI304P	Object Oriented Programming Lab	-	-	2	1	25	25	50
8	H 102	Universal Human Values – 2	3	-	-	3	30	70	50
9	AS305P	Sports, Yoga, & Career Development *	-	-	2	0	-	-	-
Total			**16**	**3**	**8**	**22**	**225**	**425**	**650**

* **Career Development (Interpersonal Skills, Aptitude, and Logical Thinking)**

Scheme of Examination of Bachelor of Technology

(Artificial Intelligence)

Semester Pattern

IV Semester B. Tech. (Artificial Intelligence)

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Continual Assessment	End Sem Examination	Total
1	AI401T	Data Engineering	4	-	-	4	30	70	100
2	AI402T	Internet of Things	3	1	-	4	30	70	100
3	AI402P	Internet of Things Lab			2	1	25	25	50
4	AI403T	AI Principles & Techniques	3	1	-	4	30	70	100
5	AI403P	AI Principles & Techniques Lab	-	-	2	1	25	25	50
6	AI404T	Computer Architecture and Organization	3	-	-	3	30	70	100
7	AI405P	Software Lab - 1 (Programming Lab using Python and R)	-	-	4	2	50	50	100
8	AS401T	Constitution of India	2	-	-	0	15	35	50
9	AS402P	Technical Skill Development	-	-	2	1	-	50	50
10	AS403T	Career Development *	2	-	-	0	-	-	-
Total			**17**	**2**	**10**	**20**	**235**	**465**	**700**

* **Career Development** **(Interpersonal Skills, Aptitude, and Logical Thinking)**

Scheme of Examination of Bachelor of Technology

(Artificial Intelligence)

Semester Pattern

V Semester B. Tech. (Artificial Intelligence)

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Continual Assessment	End Sem Examination	Total
1	AI501T	Machine Learning	3	-	-	3	30	70	100
2	AI501P	Machine Learning Lab	-	-	2	1	25	25	50
3	AI502T	Design and analysis of Algorithm	3	1	-	4	30	70	100
4	AI503T	Operating System	3	-	-	3	30	70	100
5	AI504T	Elective - I 1. Human Computer Interaction 2. Data Base Management System 3. Smart Home Technology	3	1	-	4	30	70	100
6	AI505T	Open Elective-I 1. Terminal Programming 2.Mobile Application Development	3	-	-	3	15	35	50
7	AI505P	Open Elective-I 1. Terminal Programming Lab 2.Mobile Application Development Lab	-	-	2	1	25	25	50
8	AS501T	Economics and Management	4	-	-	4	30	70	100
9	AS502T	English for Engineers	2	-	-	2	15	35	50
10	AS503P	Technical Skill Development	-	-	2	1	-	50	50
11	AS503P	Career Development *	-	-	4	0	-	-	-
Total			**21**	**2**	**10**	**26**	**230**	**520**	**750**

*** Career Development (Interpersonal Skills and Aptitude)**

Course Code	Open Elective – I
AI505T(i)	Terminal Programming
AI505T(ii)	Introduction to mobile Application Development

Scheme of Examination of Bachelor of Technology

(Artificial Intelligence)

Semester Pattern

VI Semester B. Tech. (Artificial Intelligence)

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Continual Assessment	End Sem Examination	Total
1	AI601T	Software Engineering and Project Management	3	-	-	3	30	70	100
2	AI601P	Software Engineering and Project Management Lab	-	-	2	1	25	25	50
3	AI602T	Deep Learning	3			3	30	70	100
4	AI602P	Deep Learning Lab			2	1	25	25	50
5	AI603T	Elective - II 1. Fuzzy Logic 2. Information Security 3. Edge Computing	3	1	-	4	30	70	100
6	AI604T	Elective - III 1. Big Data Visualization 2. Genetic Algorithm 3. Cloud Computing	3	1	-	4	30	70	100
7	AI605T	Open Elective-II 1. Blockchain Technologies 2. Fundamentals of Digital Image and Video Processing	3	1	-	4	30	70	100
8	AI606P	Project – I	-	-	4	2	50	50	100
9	H 103/4	Foundational Humanities Elective	2	-	-	0	-	-	-
10	AS601P	Career Development*	-	-	4	0	-	-	-
11	AS602P	Capstone Course – I **	-	-	2	1	25	25	50
Total			**19**	**3**	**14**	**23**	**275**	**475**	**750**

* **Career Development (Interpersonal Skills and Aptitude)**

** **Capstone Course – I (Comprehensive knowledge gained in Artificial Intelligence)**

Course Code	Open Elective – II
AI605T(i)	Bitcoins & Cryptocurrencies
AI605T(ii)	Fundamentals of Digital Image and Video Processing

Course Code	Foundational Humanities Elective
H-103	Development of Societies
H 104	Philosophy

Scheme of Examination of Bachelor of Technology

(Artificial Intelligence)

Semester Pattern

VII Semester B. Tech. (Artificial Intelligence)

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		Total
			L	T	P		Continual Assessment	End Sem Examination	
1	AI701T	Expert Systems in Artificial Intelligence	3	-	-	3	30	70	100
2	AI702P	Software Lab - 2 (Emerging Technology Lab)	-	-	2	1	25	25	50
3	AI703T	Elective - IV 1. Natural Language Processing 2. Information Retrieval 3. Computer Vision	3	-	-	3	30	70	100
4	AI703P	Elective - IV Lab 1. Natural Language Processing Lab 2. Information Retrieval Lab 3. Computer Vision Lab	-	-	2	1	25	25	50
5	AI704T	Elective - V 1. AI in Health care Domain 2. AI in Finance Domain 3. AI in Engineering Domain 4. AI in AR/VR	3	1	-	4	30	70	100
6	AI705T	Open Elective - III 1. GOOGLE Cloud Machine Learning Engine 2. Ethical Hacking	4	-	-	4	30	70	100
7	AI706P	Project – II	-	-	8	4	75	75	150
8	AS707	Summer / Winter Internship *	-	-		**2**			
9	AS708P	Capstone Course – II **	-	-	2	1	25	25	50
Total			**13**	**-**	**14**	**23**	**270**	**430**	**700**

* **Summer / Winter Internship (Evaluation of Four weeks Internship Completion till 6th Semester)**

** **Capstone Course – II (Comprehensive knowledge gained in Artificial Intelligence*)***

Course code	Open Elective - III
AI705T(i)	GOOGLE Cloud Machine Learning Engine
AI705T(ii)	Ethical Hacking

Scheme of Examination of Bachelor of Technology

(Artificial Intelligence)

Semester Pattern

VIII Semester B. Tech. (Artificial Intelligence)

Option A

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks			ESE Duration (Hrs)
			L	T	P		Continual Assessment	End Sem Examination	Total	
1	AS801P	Project based on one semester internship in Industry/Research Institute/ National Laboratories/ Incubation Center	-	-	-	12				
Total			0	0	0	12	200	200	400	

❖ End Sem Examination will consist of Evaluation of Seminar and Project report

Option B

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks			ESE Duration (Hrs)
			L	T	P		Continual Assessment	End Sem Examination	Total	
1	AI801T	Open Elective -IV 1. Data Analysis & Visualization Tools 2. AMAZON ML platform services	3	-	-	3	30	70	100	3
2	AI802T	Open Elective - V 1. Advances in Artificial Intelligence 2. Intelligent Data Management 3. Language Translation 4. Reinforcement Learning	3	-	-	3	30	70	100	3
3	AI803P	Project based on Research/ Industry/ Entrepreneurship			12	6	100	100	200	

Total	**6**	**0**	**12**	**12**	**160**	**240**	**400**	**6**

***Open electives can be MOOCs or Courses offered by department in Online/Offline mode**

Course code	**Open Elective – IV**
AI801T(i)	Data Analysis & Visualization Tools
AI801T(ii)	AMAZON ML platform services

Course code	**Open Elective - V**
AI802T(i)	Advances in Artificial Intelligence
AI802T(ii)	Intelligent Data Management
AI802T(iii)	Language Translation
AI802T(iv)	Reinforcement Learning

ST VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

Academic Year 2020-21

List of Open Elective

V Semester B.Tech.

Course Code	Open Elective – I
AI505T(i)	Terminal Programming
AI505T(ii)	Introduction to mobile Application Development

VI Semester B.Tech.

Course Code	Open Elective – II
AI605T(i)	Blockchain Technologies
AI605T(ii)	Fundamentals of Digital Image and Video Processing

VII Semester B.Tech.

Course code	Open Elective - III
AI705T(i)	GOOGLE Cloud Machine Learning Engine
AI705T(ii)	Ethical Hacking

VIII Semester B.Tech.

Course code	Open Elective – IV
AI801T(i)	Data Analysis & Visualization Tools
AI801T(ii)	AMAZON ML platform services

Course code	Open Elective - V
AI802T(i)	Advances in Artificial Intelligence

AI802T(ii)	Intelligent Data Management
AI802T(iii)	Language Translation
AI802T(iv)	Reinforcement Learning

ST VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

Academic Year 2020-21

List of Professional Electives

V Semester B.Tech.

Course Code	Elective – I
AI504T(i)	Human Computer Interaction
AI504T(ii)	Data Base Management System
AI504T(iii)	Introduction to IOT

VI Semester B.Tech.

Course code	Elective – II
AI603T(i)	Human Computer Interaction
AI603T(ii)	Information Security
AI603T(iii)	Edge Computing

Course code	Elective – III
AI604T(i)	Big Data Visualization
AI604T(ii)	Genetic Algorithm
AI604T(iii)	Cloud Computing

VII Semester B.Tech.

Course code	Elective – IV
AI703T(i)	Fuzzy Logic
AI703T(ii)	Information Retrieval
AI703T(iii)	Computer Vision

Course code	Elective – V

AI704T(i)	AI in Health care Domain
AI704T(ii)	AI in Finance Domain
AI704T(iii)	AI in Engineering Domain
AI704T(iv)	AI in AR/VR

ST VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY

Academic Year 2021-22

B. Tech. (Minor in Artificial Intelligence)

Sem	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		Total
			L	T	P		Continual Assessment	End Sem Examination	
IV	AIM401T	AI Principles & Techniques	3	-	-	3	30	70	100
V	AIM401P	AI Principles & Techniques Lab	-	-	2	1	25	25	50
V	AIM502T	Software Engineering and Project Management	3	-	-	3	30	70	100
V	AIM502P	Software Engineering and Project Management Lab	-	-	2	1	25	25	50
VI	AIM603T	Data Warehousing and Mining	3	-	-	3	30	70	100
VI	AIM603P	Data Warehousing and Mining Lab	-	-	2	1	25	25	50
VII	AIM704T	AI in Health care Domain	4	-	-	4	30	70	100
VIII	AIM805T	Data Analysis & Visualization Tools	4	-	-	4	30	70	100
Total			**17**	**-**	**6**	**20**	**225**	**425**	**650**

ST VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY

Academic Year 2021-22

B. Tech. (Honors in Artificial Intelligence)

Sem	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		Total
			L	T	P		Continual Assessment	End Sem Examination	
IV	AIH501T	Essential Mathematics for Machine Learning	4			4	30	70	100
V	AIH502T	Introduction to Artificial Intelligence (AI), Data Visualization with Python and R	4			4	30	70	100
VI	AIH603T	How Google does Machine Learning, Launching into Machine Learning	4			4	30	70	100
VII	AIH704T	Introduction to TensorFlow, Feature Engineering	4			4	30	70	100
VIII	AIH805T	Art and Science of Machine Learning, Google Cloud Big Data and Machine Learning Fundamentals, Business Transformation with Google Cloud, Infrastructure and Application Modernization with	4			4	30	70	100

		Google Cloud, Managing Machine Learning Projects with Google Cloud							
Total			**20**	**-**	**-**	**20**	**150**	**350**	**500**