DIVISION OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

B.Tech. Computer Science and Engineering (Artificial Intelligence) - 2024 Batch onwards

COURSE COMPONENTS AND CURRICULUM

PROGRAM STRUCTURE

Sl. No.	Course Category / Component	Abbreviation	Credits
1	Humanities and Social Sciences including Management and Entrepreneurship Courses	**HSMC**	14
2	Basic Science Courses	**BSC**	12
3	Engineering Science Courses	**ESC**	16
4	Professional Core Courses	**PCC**	66
5	Mini Project / Summer Internship Program / Internship	**P**	6
6	Project work		14
7	Professional Elective Courses	**PEC**	21
8	Open Elective Courses	**OEC**	6
9	Mandatory Courses	**MC**	0
10	Skill Based Courses	**SBC**	5
11	Online Courses		5
Total Credits			**165**

COURSE COMPONENTS

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT AND ENTREPRENEURSHIP COURSES [HSMC]						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	NPTEL	English / French / German / Japanese	2	0	0	2
2	UHV	Universal Human Values – II	2	1	0	3
3	23MS2001	Concepts and Applications in Entrepreneurship	3	0	0	3
4	20MS2007	Business Plan	3	0	0	3
5	23CS1013	Ethics in Information Technology	2	0	0	2
6	20MS2005	Soft Skills	1	0	0	1
Number of credits to be earned in Humanities and Social Sciences including Management and Entrepreneurship Category						**14**
BASIC SCIENCE COURSES [BSC]						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	23MA1001	Matrices, Calculus and Ordinary Differential Equations	3	0	0	3
2	23MA1002	Partial Differential Equations, Vector Spaces and Laplace Transform	3	0	0	3
3	23MA2001	Probability and Statistics	3	0	0	3
4	23MA2002	Discrete Structures	3	0	0	3
Number of credits to be earned in Basic Science Category						**12**

ENGINEERING SCIENCE COURSES [ESC]						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	23CS1001	Digital System Design	3	0	0	3
2	23CS1002	Digital System Design Lab	0	0	2	1
3	23CS1005	Programming for Problem Solving	3	0	0	3
4	23CS1006	Programming for Problem Solving Lab	0	0	3	1.5
5	23CS1007	Python Programming	3	0	0	3
6	23CS1008	Python Programming Lab	0	0	3	1.5
7	23CS1012	Computer Organization and Architecture	3	0	0	3
Number of credits to be earned in Engineering Science Category						**16**
PROFESSIONAL CORE COURSES [PCC]						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	23CS1009	Artificial Intelligence in IoT	3	0	0	3
2	23CS1010	Artificial Intelligence in IoT Lab	0	0	3	1.5
3	23CS2001	Artificial Intelligence: Principles and Techniques	3	0	0	3
4	23CS2004	Computer Networks	3	0	0	3
5	23CS2005	Computer Networks Lab	0	0	3	1.5
6	23CS2011	Data Structures and Algorithms	3	0	0	3
7	23CS2012	Data Structures and Algorithms Lab	0	0	3	1.5
8	23CS2013	Database Management Systems	3	0	0	3
9	23CS2014	Database Management Systems Lab	0	0	3	1.5
10	23CS2017	Design and Analysis of Algorithms	3	0	0	3
11	23CS2032	Object Oriented Programming	3	0	0	3
12	23CS2033	Object Oriented Programming Lab	0	0	3	1.5
13	23CS2035	Operating Systems	3	0	0	3
14	23CS2045	System Software and Compiler Design	3	0	0	3
15	23CS2046	Theory of Computation	3	0	0	3
16	23AI2001	Artificial Intelligence for Cyber Security	3	0	0	3
17	23AI2002	Artificial Intelligence in Web Development	3	0	0	3
18	23AI2003	Artificial Intelligence in Web Development Lab	0	0	3	1.5
19	23AI2004	Conversational Artificial Intelligence	3	0	0	3
20	23AI2005	Conversational Artificial Intelligence Lab	0	0	3	1.5
21	23AI2006	Cyber Threat Intelligence and Analytics	3	0	0	3
22	23AI2007	Cyber Threat Intelligence and Analytics Lab	0	0	3	1.5
23	23AI2008	Edge Artificial Intelligence	3	0	0	3
24	23AI2009	Essentials of Generative Artificial Intelligence	3	0	0	3

25	23AI2010	Essentials of Information Retrieval	3	0	0	3
26	23AI2011	Software Engineering for Artificial Intelligence Systems	3	0	0	3
Number of credits to be earned in Professional Core Category						**66**

SEMESTER WISE CURRICULUM

SEMESTER-1 **(Focus on Basics of Programming and Entrepreneurship)**						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	NPTEL	English / French / German / Japanese	2	0	0	2
2	23MA1001	Matrices, Calculus and Ordinary Differential Equations	3	0	0	3
3	23CS1001	Digital System Design	3	0	0	3
4	23CS1005	Programming for Problem Solving	3	0	0	3
5	23MS2001	Concepts and Applications in Entrepreneurship	3	0	0	3
6	MC-01	Mandatory Course I				
Sub Total Credits for Theory Courses						**14**
Laboratory Courses						
1	23CS1002	Digital System Design Lab	0	0	2	1
2	23CS1006	Programming for Problem Solving Lab	0	0	3	1.5
3	SBC-01	Skill Based Course - I	0	0	2	1
Sub Total Credits for Laboratory Courses						**3.5**
Total						**17.5**
SEMESTER-2 **(Focus on Fundamentals of IoT and Programming)**						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23MA1002	Partial Differential Equations, Vector Spaces and Laplace Transform	3	0	0	3
2	23CS1007	Python Programming	3	0	0	3
3	23CS1009	Artificial Intelligence in IoT	3	0	0	3
4	23CS1012	Computer Organization and Architecture	3	0	0	3
5	23CS1013	Ethics in Information Technology	2	0	0	2
6	20MS2007	Business Plan	3	0	0	3
7	MC-02	Mandatory Course II				
Sub Total Credits for Theory Courses						**17**
Laboratory Courses						
1	23CS1008	Python Programming Lab	0	0	3	1.5
2	23CS1010	Artificial Intelligence in IoT Lab	0	0	3	1.5

3	SBC-02	Skill Based Course - II	0	0	2	1
Sub Total Credits for Laboratory Courses						**4**
Total						**21**
SEMESTER-3 (Focus on Artificial Intelligence and Programming)						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23MA2001	Probability and Statistics	3	0	0	3
2	23CS2001	Artificial Intelligence: Principles and Techniques	3	0	0	3
3	23CS2011	Data Structures and Algorithms	3	0	0	3
4	23CS2032	Object Oriented Programming	3	0	0	3
5	23CS2035	Operating Systems	3	0	0	3
Sub Total Credits for Theory Courses						**15**
Laboratory Courses						
1	23CS2012	Data Structures and Algorithms Lab	0	0	3	1.5
2	23CS2033	Object Oriented Programming Lab	0	0	3	1.5
3	SBC-03	Skill Based Course – III	0	0	2	1
4	SIP2911	Summer Internship Program - I	0	0	4	2
Sub Total Credits for Laboratory Courses						**6**
Total						**21**
SEMESTER-4 (Focus on Data Management and latest AI developments)						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23MA2002	Discrete Structures	3	0	0	3
2	UHV	Universal Human Values - II	2	1	0	3
3	23CS2013	Database Management Systems	3	0	0	3
4	23CS2017	Design and Analysis of Algorithms	3	0	0	3
5	23AI2004	Conversational Artificial Intelligence	3	0	0	3
6	23AI2009	Essentials of Generative Artificial Intelligence	3	0	0	3
Sub Total Credits for Theory Courses						**18**
Laboratory Courses						
1	23CS2014	Database Management Systems Lab	0	0	3	1.5
2	23AI2005	Conversational Artificial Intelligence Lab	0	0	3	1.5
3	SBC-04	Skill Based Course – IV	0	0	2	1
Sub Total Credits for Laboratory Courses						**4**
Total						**22**
SEMESTER-5						

(Focus on the Cyber Security)						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23CS2004	Computer Networks	3	0	0	3
2	23CS2046	Theory of Computation	3	0	0	3
3	23AI2001	Artificial Intelligence for Cyber Security	3	0	0	3
4	23AI2006	Cyber Threat Intelligence and Analytics	3	0	0	3
5	23AI2010	Essentials of Information Retrieval	3	0	0	3
6	PEC-01	Professional Elective – 1	3	0	0	3
Sub Total Credits for Theory Courses						**18**
Laboratory Courses						
1	23CS2005	Computer Networks Lab	0	0	3	1.5
2	23AI2007	Cyber Threat Intelligence and Analytics Lab	0	0	3	1.5
3	SIP2912	Summer Internship Program - II	0	0	4	2
Sub Total Credits for Laboratory Courses						**5**
Total						**23**
SEMESTER-6 (Focus on Web Development and Distributed Computing)						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23CS2045	System Software and Compiler Design	3	0	0	3
2	23AI2002	Artificial Intelligence in Web Development	3	0	0	3
3	23AI2008	Edge Artificial Intelligence	3	0	0	3
4	PEC-02	Professional Elective – 2	3	0	0	3
5	OEC-01	Open Elective – 1	3	0	0	3
6	20MS2005	Soft Skills	1	0	0	1
Sub Total Credits for Theory Courses						**16**
	Laboratory Courses					
1	PEC-03	Professional Elective – 3	0	0	3	1.5
2	23AI2003	Artificial Intelligence in Web Development Lab	0	0	3	1.5
3	MP2911	Mini Project	0	0	4	2
Sub Total Credits for Laboratory Courses						**5**
Total						**21**
SEMESTER-7 (Focus on Artificial Intelligence Applications)						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	

Theory Courses						
1	23AI2011	Software Engineering for Artificial Intelligence Systems	3	0	0	3
2	PEC-04	Professional Elective – 4	3	0	0	3
3	PEC-05	Professional Elective – 5	3	0	0	3
4	PEC-06	Professional Elective – 6	3	0	0	3
5	PEC-07	Professional Elective – 7	3	0	0	3
5	OEC-02	Open Elective – 2	3	0	0	3
Sub Total Credits for Theory Courses						**18**
Laboratory Courses						
1	PEC-08	Professional Elective – 8	0	0	3	1.5
2	SBC-05	Skill Based Course – V	0	0	2	1
Sub Total Credits for Laboratory Courses						**2.5**
Total						**20.5**

SEMESTER-8
(Project Focusing on Food, Water, Sustainable Energy and Healthcare sectors and KITS Technology Missions)

Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
Project						
1	24AI2999	Project	0	0	28	14
Sub Total credits for Project						**14**
Total						**14**
Online Courses						5
	Grand Total including Online Courses					**165**

B.Tech. Computer Science and Engineering (Artificial Intelligence and Machine Learning) -2024 Batch
COURSE COMPONENTS AND CURRICULUM
PROGRAM STRUCTURE

Sl. No.	Course Category / Component	Abbreviation	Credits
1	Humanities and Social Sciences including Management and Entrepreneurship Courses	**HSMC**	14
2	Basic Science Courses	**BSC**	12
3	Engineering Science Courses	**ESC**	19
4	Professional Core Courses	**PCC**	66
5	Mini Project / Summer Internship Program / Internship	**P**	6
6	Project work		14
7	Professional Elective Courses	**PEC**	21
8	Open Elective Courses	**OEC**	6

9	Mandatory Courses	**MC**	0
10	Skill Based Courses	**SBC**	5
11	Online Courses		5
Total Credits			**165**

COURSE COMPONENTS

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT AND ENTREPRENEURSHIP COURSES [HSMC]						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	NPTEL	English / French / German / Japanese	2	0	0	2
2	UHV	Universal Human Values – II	2	1	0	3
3	23MS2001	Concepts and Applications in Entrepreneurship	3	0	0	3
4	20MS2007	Business Plan	3	0	0	3
5	23CS1013	Ethics in Information Technology	2	0	0	2
6	20MS2005	Soft Skills	1	0	0	1
Number of credits to be earned in Humanities and Social Sciences including Management and Entrepreneurship Category						**14**
BASIC SCIENCE COURSES [BSC]						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	23MA1001	Matrices, Calculus and Ordinary Differential Equations	3	0	0	3
2	23MA1002	Partial Differential Equations, Vector Spaces and Laplace Transform	3	0	0	3
3	23MA2001	Probability and Statistics	3	0	0	3
4	23MA2002	Discrete Structures	3	0	0	3
Number of credits to be earned in Basic Science Category						**12**
ENGINEERING SCIENCE COURSES [ESC]						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	23CS1001	Digital System Design	3	0	0	3
2	23CS1002	Digital System Design Lab	0	0	2	1
3	23CS1005	Programming for Problem Solving	3	0	0	3
4	23CS1006	Programming for Problem Solving Lab	0	0	3	1.5
5	23CS1007	Python Programming	3	0	0	3
6	23CS1008	Python Programming Lab	0	0	3	1.5
7	23CS1012	Computer Organization and Architecture	3	0	0	3
Number of credits to be earned in Engineering Science Category						**16**

PROFESSIONAL CORE COURSES [PCC]						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	23CS1009	Artificial Intelligence in IoT	3	0	0	3
2	23CS1010	Artificial Intelligence in IoT Lab	0	0	3	1.5
3	23CS2001	Artificial Intelligence: Principles and Techniques	3	0	0	3
4	23CS2004	Computer Networks	3	0	0	3
5	23CS2005	Computer Networks Lab	0	0	3	1.5
6	23CS2008	Data Visualization	3	0	0	3
7	23CS2009	Data Visualization Lab	0	0	3	1.5
8	23CS2011	Data Structures and Algorithms	3	0	0	3
9	23CS2012	Data Structures and Algorithms Lab	0	0	3	1.5
10	23CS2013	Database Management Systems	3	0	0	3
11	23CS2014	Database Management Systems Lab	0	0	3	1.5
12	23CS2017	Design and Analysis of Algorithms	3	0	0	3
13	23CS2028	Machine Learning Techniques	3	0	0	3
14	23CS2029	Machine Learning Techniques Lab	0	0	3	1.5
15	23CS2032	Object Oriented Programming	3	0	0	3
16	23CS2033	Object Oriented Programming Lab	0	0	3	1.5
17	23CS2035	Operating Systems	3	0	0	3
18	23CS2045	System Software and Compiler Design	3	0	0	3
19	23CS2046	Theory of Computation	3	0	0	3
20	23AI2002	Artificial Intelligence in Web Development	3	0	0	3
21	23AI2003	Artificial Intelligence in Web Development Lab	0	0	3	1.5
22	23AI2009	Essentials of Generative Artificial Intelligence	3	0	0	3
23	23AI2010	Essentials of Information Retrieval	3	0	0	3
24	23AI2011	Software Engineering for Artificial Intelligence Systems	3	0	0	3
25	23AI2012	Foundation of Generative Adversarial Networks	3	0	0	3
26	24AI2013	Foundation of Natural Language Processing	3	0	0	3
Number of credits to be earned in Professional Core Category						**66**

SEMESTER WISE CURRICULUM

SEMESTER-1 (Focus on Basics of Programming and Entrepreneurship)						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	NPTEL	English / French / German / Japanese	2	0	0	2
2	23MA1001	Matrices, Calculus and Ordinary Differential Equations	3	0	0	3

3	23CS1001	Digital System Design	3	0	0	3
4	23CS1005	Programming for Problem Solving	3	0	0	3
5	23MS2001	Concepts and Applications in Entrepreneurship	3	0	0	3
6	MC-01	Mandatory Course I				
Sub Total Credits for Theory Courses						**14**
Laboratory Courses						
1	23CS1002	Digital System Design Lab	0	0	2	1
2	23CS1006	Programming for Problem Solving Lab	0	0	3	1.5
3	SBC-01	Skill Based Course – I	0	0	2	1
Sub Total Credits for Laboratory Courses						**3.5**
Total						**17.5**

SEMESTER-2
(Focus on Fundamentals of Artificial Intelligence in IoT and Programming)

Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23MA1002	Partial Differential Equations, Vector Spaces and Laplace Transform	3	0	0	3
2	23CS1007	Python Programming	3	0	0	3
3	23CS1009	Artificial Intelligence in IoT	3	0	0	3
3	23CS1012	Computer Organization and Architecture	3	0	0	3
4	23CS1013	Ethics in Information Technology	2	0	0	2
5	20MS2007	Business Plan	3	0	0	3
6	MC-02	Mandatory Course II				
Sub Total Credits for Theory Courses						**17**
Laboratory Courses						
1	23CS1008	Python Programming Lab	0	0	3	1.5
2	23CS1010	Artificial Intelligence in IoT Lab	0	0	3	1.5
3	SBC-02	Skill Based Course – II	0	0	2	1
Sub Total Credits for Laboratory Courses						**4**
Total						**21**

SEMESTER-3
(Focus on Programming and Artificial Intelligence Principles and Techniques)

Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23MA2001	Probability and Statistics	3	0	0	3
2	23CS2001	Artificial Intelligence: Principles and Techniques	3	0	0	3
3	23CS2011	Data Structures and Algorithms	3	0	0	3
4	23CS2032	Object Oriented Programming	3	0	0	3

5	23CS2035	Operating Systems	3	0	0	3
Sub Total Credits for Theory Courses						**15**
Laboratory Courses						
1	23CS2012	Data Structures and Algorithms Lab	0	0	3	1.5
2	23CS2033	Object Oriented Programming Lab	0	0	3	1.5
3	SBC-03	Skill Based Course – III	0	0	2	1
4	SIP2911	Summer Internship Program – I	0	0	4	2
Sub Total Credits for Laboratory Courses						**6**
Total						**21**

SEMESTER-4
(Focus on Artificial Intelligence Applications and Data Visualization)

Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
Theory Courses						
1	23MA2002	Discrete Structures	3	0	0	3
2	UHV	Universal Human Values – II	2	1	0	3
3	23CS2008	Data Visualization	3	0	0	3
4	23CS2013	Database Management Systems	3	0	0	3
5	23CS2017	Design and Analysis of Algorithms	3	0	0	3
6	23AI2009	Essentials of Generative Artificial Intelligence	3	0	0	3
Sub Total Credits for Theory Courses						**18**
Laboratory Courses						
1	23CS2009	Data Visualization Lab	0	0	3	1.5
2	23CS2014	Database Management Systems Lab	0	0	3	1.5
3	SBC-04	Skill Based Course – IV	0	0	2	1
Sub Total Credits for Laboratory Courses						**4**
Total						**22**

SEMESTER-5
(Focus on Machine Learning Techniques and Information Retrieval))

Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
Theory Courses						
1	23CS2004	Computer Networks	3	0	0	3
2	23CS2028	Machine Learning Techniques	3	0	0	3
3	23CS2046	Theory of Computation	3	0	0	3
4	23AI2010	Essentials of Information Retrieval	3	0	0	3
5	23AI2012	Foundation of Generative Adversarial Networks	3	0	0	3
6	PEC-01	Professional Elective – 1	3	0	0	3
Sub Total Credits for Theory Courses						**18**
Laboratory Courses						

1	23CS2005	Computer Networks Lab	0	0	3	1.5
2	23CS2029	Machine Learning Techniques Lab	0	0	3	1.5
3	SIP2912	Summer Internship Program – II	0	0	2	2
Sub Total Credits for Laboratory Courses						**5**
Total						**23**

SEMESTER-6 **(Focus on Basics of Natural Language Processing)**						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23CS2045	System Software and Compiler Design	3	0	0	3
2	23AI2002	Artificial Intelligence in Web Development	3	0	0	3
3	23AI2013	Foundation of Natural Language Processing	3	0	0	3
4	PEC-02	Professional Elective – 2	3	0	0	3
5	OEC-01	Open Elective – 1	3	0	0	3
6	20MS2005	Soft Skills	1	0	0	1
Sub Total Credits for Theory Courses						**16**
	Laboratory Courses					
1	PEC-03	Professional Elective – 3	0	0	3	1.5
2	23AI2003	Artificial Intelligence in Web Development Lab	0	0	3	1.5
3	MP2911	Mini Project	0	0	4	2
Sub Total Credits for Laboratory Courses						**5**
Total						**21**

SEMESTER-7 **(Focus on Artificial Intelligence Applications)**						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory Courses						
1	23AI2011	Software Engineering for Artificial Intelligence Systems	3	0	0	3
2	PEC-04	Professional Elective – 4	3	0	0	3
3	PEC-05	Professional Elective – 5	3	0	0	3
4	PEC-06	Professional Elective – 6	3	0	0	3
5	PEC-07	Professional Elective – 7	3	0	0	3
6	OEC-02	Open Elective – 2	3	0	0	3
Sub Total Credits for Theory Courses						**18**
Laboratory Courses						
1	PEC-08	Professional Elective – 8	0	0	3	1.5
2	SBC-05	Skill Based Course – V	0	0	2	1
Sub Total Credits for Laboratory Courses						**2.5**

Total						20.5
SEMESTER-8 (Project Focusing on Food, Water, Sustainable Energy and Healthcare sectors and KITS Technology Missions)						
Sl. No.	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Project						
1	24AI2999	Project	0	0	28	14
Sub Total credits for Project						**14**
Total						**14**
Online Courses						5
Grand Total including Online Courses						**165**