

**DIVISION OF  
ARTIFICIAL INTELLIGENCE  
AND MACHINE LEARNING**

**B.Tech. Computer Science and Engineering (Artificial Intelligence) - 2023 Batch**  
**REVISED COURSE COMPONENTS AND CURRICULUM**  
**PROGRAM STRUCTURE**

Sl. No.	Course Category / Component	Abbreviation	Credits
1	Humanities and Social Sciences including Management and Entrepreneurship Courses	<b>HSMC</b>	11
2	Basic Science Courses	<b>BSC</b>	12
3	Engineering Science Courses	<b>ESC</b>	16
4	Professional Core Courses	<b>PCC</b>	69
5	Mini Project / Summer Internship Program / Internship	<b>P</b>	6
6	Project work		14
7	Professional Elective Courses	<b>PEC</b>	21
8	Open Elective Courses	<b>OEC</b>	6
9	Mandatory Courses	<b>MC</b>	0
10	Skill Based Courses	<b>SBC</b>	5
11	Online Courses		5
<b>Total Credits</b>			<b>165</b>

**COURSE COMPONENTS**

<b>HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT AND ENTREPRENEURSHIP COURSES [HSMC]</b>						
Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	NPTEL	English / French / German / Japanese	2	0	0	2
2	23MS2001	Concepts and Applications in Entrepreneurship	3	0	0	3
3	20MS2007	Business Plan	3	0	0	3
4	23CS1013	Ethics in Information Technology	2	0	0	2
5	20MS2005	Soft Skills	1	0	0	1
<b>Number of credits to be earned in Humanities and Social Sciences including Management and Entrepreneurship Category</b>						<b>11</b>
<b>BASIC SCIENCE COURSES [BSC]</b>						
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
<b>Number of credits to be earned in Basic Science Category</b>						<b>12</b>
<b>ENGINEERING SCIENCE COURSES [ESC]</b>						
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



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
<b>Sub Total Credits for Laboratory Courses</b>						<b>6</b>
<b>Total</b>						<b>21</b>
<b>SEMESTER-4</b> <b>(Focus on Data Management and latest AI developments)</b>						
Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
<b>Theory Courses</b>						
1	23MA2002	Discrete Structures	3	0	0	3
2	23CS2024	Data Science Ecosystem	3	0	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
<b>Sub Total Credits for Theory Courses</b>						<b>18</b>
<b>Laboratory Courses</b>						
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
<b>Sub Total Credits for Laboratory Courses</b>						<b>4</b>
<b>Total</b>						<b>22</b>
<b>SEMESTER-5</b> <b>(Focus on the Cyber Security)</b>						
Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
<b>Theory Courses</b>						
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
<b>Sub Total Credits for Theory Courses</b>						<b>18</b>
<b>Laboratory Courses</b>						
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
<b>Sub Total Credits for Laboratory Courses</b>						<b>5</b>
<b>Total</b>						<b>23</b>
<b>SEMESTER-6</b> <b>(Focus on Web Development and Distributed Computing)</b>						

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	23AI2999	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) -2023  
Batch**

**REVISED COURSE COMPONENTS AND CURRICULUM  
PROGRAM STRUCTURE**

Sl. No.	Course Category / Component	Abbreviation	Credits
1	Humanities and Social Sciences including Management and Entrepreneurship Courses	<b>HSMC</b>	11
2	Basic Science Courses	<b>BSC</b>	12
3	Engineering Science Courses	<b>ESC</b>	16
4	Professional Core Courses	<b>PCC</b>	69
5	Mini Project / Summer Internship Program / Internship	<b>P</b>	6
6	Project work		14
7	Professional Elective Courses	<b>PEC</b>	21
8	Open Elective Courses	<b>OEC</b>	6
9	Mandatory Courses	<b>MC</b>	0
10	Skill Based Courses	<b>SBC</b>	5
11	Online Courses		5
<b>Total Credits</b>			<b>165</b>

**COURSE COMPONENTS**

<b>HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT AND ENTREPRENEURSHIP COURSES [HSMC]</b>						
Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	NPTEL	English / French / German / Japanese	2	0	0	2
2	23MS2001	Concepts and Applications in Entrepreneurship	3	0	0	3
3	20MS2007	Business Plan	3	0	0	3
4	23CS1013	Ethics in Information Technology	2	0	0	2
5	20MS2005	Soft Skills	1	0	0	1
<b>Number of credits to be earned in Humanities and Social Sciences including Management and Entrepreneurship Category</b>						<b>11</b>
<b>BASIC SCIENCE COURSES [BSC]</b>						
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
<b>Number of credits to be earned in Basic Science Category</b>						<b>12</b>
<b>ENGINEERING SCIENCE COURSES [ESC]</b>						
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
<b>Number of credits to be earned in Engineering Science Category</b>						<b>16</b>
<b>PROFESSIONAL CORE COURSES [PCC]</b>						
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	23CS2024	Data Science Ecosystem	3	0	0	3
14	23CS2028	Machine Learning Techniques	3	0	0	3
15	23CS2029	Machine Learning Techniques Lab	0	0	3	1.5
16	23CS2032	Object Oriented Programming	3	0	0	3
17	23CS2033	Object Oriented Programming Lab	0	0	3	1.5
18	23CS2035	Operating Systems	3	0	0	3
19	23CS2045	System Software and Compiler Design	3	0	0	3
20	23CS2046	Theory of Computation	3	0	0	3
21	23AI2002	Artificial Intelligence in Web Development	3	0	0	3
22	23AI2003	Artificial Intelligence in Web Development Lab	0	0	3	1.5
23	23AI2009	Essentials of Generative Artificial Intelligence	3	0	0	3
24	23AI2010	Essentials of Information Retrieval	3	0	0	3
25	23AI2011	Software Engineering for Artificial Intelligence Systems	3	0	0	3
26	23AI2012	Foundation of Generative Adversarial Networks	3	0	0	3
27	24AI2013	Foundation of Natural Language Processing	3	0	0	3
<b>Number of credits to be earned in Professional Core Category</b>						<b>69</b>



### 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	23CS2024	Data Science Ecosystem	3	0	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	23AI2999	Project	0	0	28	14
<b>Sub Total credits for Project</b>						<b>14</b>
<b>Total</b>						<b>14</b>
<b>Online Courses</b>						<b>5</b>
<b>Grand Total including Online Courses</b>						<b>165</b>