MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B. Tech
COMPUTER SCIENCE AND ENGINEERING
(Artificial Intelligence)

CURRICULUM

FOR

B. TECH DEGREE PROGRAMME

IN

COMPUTER SCIENCE AND ENGINEERING
(Artificial Intelligence)

2022 SCHEME

(AUTONOMOUS)

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, Autonomous Institution Affiliated to APJ Abdul Kalam Technological University)

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(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B. TECH DEGREE PROGRAMME

IN

COMPUTER SCIENCE AND ENGINEERING (Artificial Intelligence)

CURRICULUM AND DETAILED SYLLABI

2022 SCHEME

Items	Board of Studies(BOS)	Academic Council(AC)
Date of Approval	16.08.2022	21.11.2022

sd/-
Head of Department
Chairman, Board of Studies

sd/-
Principal
Chairman, Academic Council

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

Vision and Mission of the Institution

Vision:

To be an Institution moulding globally competent professionals as epitomes of Noble Values.

Mission:

To transform the Youth as technically competent, ethically sound and socially committed professionals, by providing a vibrant learning ambience for the welfare of humanity.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Vision and Mission of the Department

Vision:

To be a Centre of Excellence in Computer Science and Engineering providing quality education and research for the betterment of the society.

Mission:

To impart sound knowledge in theoretical and applied foundations of Computer Science and Engineering, and to train the students to solve real life issues to effectively define and shape life.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Graduates will be successful professionals in Industries of core or interdisciplinary natureor entrepreneurs, demonstrating effective leadership and excellent team work.

PEO2: Graduates will expand the horizon of knowledge through higher education or research, leading to self-directed professional development

PEO3: Graduates will demonstrate competency in AI & ML, professional attitude and ethics whileproviding solutions in societal and environmental contexts

PROGRAMME OUTCOMES (POs)

Engineering graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **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.
3. **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.
4. **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.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **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.
7. **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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **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.
11. **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.
12. **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.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: To apply Algorithmic Principles, Programming Skills and Software Engineering Principlesto design, develop and evaluate Software Systems of varying complexities.

PSO2: To apply knowledge of System Integration to design and implement computer-based systems

PSO3: To solve real world and socially relevant problems using AI and ML techniques

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.Tech. Programme in Computer Science and Engineering

(Artificial Intelligence)

For the students admitted from 2022-23

Scheduling of Courses

i) Knowledge Segments and Credits

Every course of B. Tech Programme is placed in one of the nine categories as listed in table below. No semester shall have more than six lecture-based courses and two laboratory courses, and/or drawing/seminar/project courses in the curriculum.

Table 1: Credit distribution and the Knowledge Domains

Sl. No.	Category	Category Code	Total credits
1	Humanities and Social Sciences including Management Courses	HSC	5
2	Basic Science Courses	BSC	26
3	Engineering Science Courses	ESC	22
4	Programme Core Courses, Comprehensive Course Work and Viva Voce	PCC	79
5	Programme Elective Courses	PEC	15
6	Open Elective Courses	OEC	03
7	Project Work and Seminar	PWS	10
8	Mandatory Non-credit Courses (P/F) with Grade	MNC	Non-Credit
9	Mandatory Student Activities (P/F)	MSA	2
Total Mandatory Credits			**162**

ii) Semester-wise Credit Distribution

Semester	***I***	***II***	***III***	***IV***	***V***	***VI***	***VII***	***VIII***	***Total***
Credits for Courses	20	18	22	22	24	22	15	17	***160***
Activity Points (Min.)	*40*				*60*				***100***
Credits for Activities	*2*								***2***
Total Credits									***162***

SEMESTER I						
Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	BSC	MA0U10A	Linear Algebra and Calculus	3-1-0	4	4
B ½	BSC	PH0U10C	Engineering Physics-C	2-1-0	3	3
		CYOU10B	Engineering Chemistry-B	2-1-0	3	3
C ½	ESC	ES0U10A	Engineering Mechanics	2-1-0	3	3
		ES0U10B	Engineering Graphics	2-0-2	4	3
D ½	ESC	ES0U10C	Basics of Civil and Mechanical Engineering	4-0-0	4	4
		ES0U10D	Basics of Electrical and ElectronicsEngineering	4-0-0	4	4
E	HSC	HS0U10A	Life Skills	2-0-2	4	---
F	ESC	ES0U10G	Problem Solving & Programming in C	3-0-2	5	4
S ½	BSC	PHOU18A	Physics Lab	0-0-2	2	1
		CYOU18A	Chemistry Lab	0-0-2	2	1
T ½	ESC	ES0U18A	Civil and Mechanical Workshop	0-0-2	2	1
		ES0U18B	Electrical and Electronics Workshop	0-0-2	2	1
			TOTAL		**27/28**	**20**

SEMESTER II						
Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	BSC	MA0U10B	Vector Calculus, Differential Equations and Transforms	3-1-0	4	4
B 1/2	BSC	PH0U10C	Engineering Physics-C	3-0-0	3	3
		CYOU10B	Engineering Chemistry-B	3-0-0	3	3
C 1/2	ESC	ES0U10A	Engineering Mechanics	2-1-0	3	3
		ES0U10B	Engineering Graphics	2-0-2	4	3
D 1/2	ESC	ES0U10C	Basics of Civil and Mechanical Engineering	4-0-0	4	4
		ES0U10D	Basics of Electrical and Electronics Engineering	4-0-0	4	4
E	HSC	HS0U10B	Professional Communication	2-0-2	4	---
F	ESC	ES0U10H	Introduction to Python	2-0-0	2	2
S 1/2	BSC	PHOU18A	Physics Lab	0-0-2	2	1
		CYOU18A	Chemistry Lab	0-0-2	2	1
T 1/2	ESC	ES0U18A	Civil and Mechanical Workshop	0-0-2	2	1
		ES0U18B	Electrical and Electronics Workshop	0-0-2	2	1
Total					**24/25**	**18**

SEMESTER III						
Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	BSC	MA0U20G	Discrete Mathematical Structures	3-1-0	4	4
B	PCC	CS1U20A	Data Structures	3-1-0	4	4
C	PCC	CS1U20B	Logic System Design	3-1-0	4	4
D	PCC	CS2U20A	Object Oriented Programming using Python	3-1-0	4	4
E 1/2	ESC	ES0U20A	Design and Engineering	2-0-0	2	2
	HSC	HS0U20A	Professional Ethics	2-0-0	2	2
F	MNC	NC0U20B	Constitution of India	2-0-0	2	---
S	PCC	CS1U28A	Data Structures Lab	0-0-3	3	2
T	PCC	CS2U28A	Object Oriented Programming Lab (in Python)	0-0-3	3	2
R/M	VAC		Remedial/Minor Course	3-1-0	4	4
TOTAL					**26/30**	**22/26**

SEMESTER IV						
Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	BSC	MA0U20F	Mathematics for Artificial Intelligence	3-1-0	4	4
B	PCC	CS1U20D	Computer Organization And Architecture	3-1-0	4	4
C	PCC	CS1U20E	Database Management Systems	3-1-0	4	4
D	PCC	CS2U20B	Introduction to Artificial Intelligence	3-1-0	4	4
E ½	ESC	ES0U20A	Design and Engineering	2-0-0	2	2
	HSC	HS0U20A	Professional Ethics	2-0-0	2	2
F	MNC	NC0U20C	Universal Human Values-II	2-0-0	2	---
S	PCC	CS2U28B	AI Algorithms Lab	0-0-3	3	2
T	PCC	CS1U28E	Database Management Lab	0-0-3	3	2
R/M/H	VAC		Remedial/Minor / Honours Course	3-1-0	4	4
TOTAL					**26/30**	**22/26**

SEMESTER V						
Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	PCC	CS1U30A	Formal Languages and Automata Theory	3-1-0	4	4
B	PCC	CS1U30B	Computer Networks	3-1-0	4	4
C	PCC	CS1U30K	Operating Systems	3-1-0	4	4
D	PCC	CS2U30C	Introduction to Machine Learning	3-1-0	4	4
E	PCC	CS2U30D	Artificial Neural Network	3-1-0	4	4
F	MNC	NC0U30A	Disaster Management	2-0-0	2	---
S	PCC	CS2U38A	Operating Systems and Networking Lab	0-0-4	4	2
T	PCC	CS2U38B	Machine Learning Lab	0-0-4	4	2
R/M/H	VAC		Remedial/Minor/HonoursCourse	3-1-0	4	4
TOTAL					**30/34**	**24/28**

SEMESTER VI						
Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	PCC	CS2U30E	Robotics and Intelligent System	3-1-0	4	4
B	PCC	CS1U30H	Algorithm Analysis and Design	3-1-0	4	4
C	PCC	CS1U30E	Management of Software Systems	3-0-0	3	3
D	PEC	CS2UXXX CS1UXXX	Program elective I	2-1-0	3	3
E	HSC	HS0U30A	Industrial Economics & Foreign Trade	3-0-0	3	3
F	PCC	CS2U30I	Comprehensive Course Work	1-0-0	1	1
S	PCC	CS2U38C	Robotics Lab	0-0-3	3	2
T	PWS	CS2U39A	Mini Project	0-0-3	3	2
R/M/H	VAC		Remedial/Minor/Honours Course	3-1-0	4	4
TOTAL					**24/28**	**22/26**

PROGRAMME ELECTIVE I

Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
D	PEC	CS2U31A	Concepts in computer graphics and image processing	2-1-0	3	3
		CS1U31C	Foundations of security in computing	2-0-2	4	3
		CS2U31B	Object Oriented Programming using Java	2-1-0	3	3
		CS2U31E	Programming in R	2-1-0	3	3
		CS2U31C	Machine Learning models and Storage Management	2-1-0	3	3
		CS1U31B	Data Analytics	2-1-0	3	3

SEMESTER VII						
Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	PCC	CS2U40A	Foundations of Deep Learning	2-1-0	3	3
B	PEC	CS2UXXX CS1UXXX	Programme Elective II	2-1-0	3	3
C	OEC	CS0UXXX	Open Elective	2-1-0	3	3
D	MNC	NC0U40A	Industrial Safety Engineering	2-1-0	3	---
E	PCC	CS2U48A	Deep Learning Lab	0-0-3	3	2
T	PWS	CS2U49A	Seminar	0-0-3	3	2
U	PWS	CS2U49B	Project Phase I	0-0-6	6	2
R/M/H	VAC		Remedial/Minor/HonoursCourse	0-1-6/ 3-1-0	7/4	4
TOTAL					**24 (31/28)**	**15/19**

PROGRAMME ELECTIVE II

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
D	PEC	CS2U41A	Big data Analytics	2-1-0	3	3
		CS2U41B	Social Network Analysis	2-1-0	3	3
		CS2U41C	Data Mining	2-1-0	3	3
		CS2U41D	AI for Health Care	2-1-0	3	3
		CS2U41E	Game Theory in Artificial Intelligence	2-1-0	3	3
		CS1U41F	Natural Language Processing	2-1-0	3	3
		CS2U41F	Cloud Data Management	2-1-0	3	3

OPEN ELECTIVE I

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
C	OEC	CS0U41A	Introduction to Mobile Computing	2-1-0	3	3
		CS0U41B	Introduction to Deep Learning	2-1-0	3	3
		CS0U41C	Computer Graphics and Image Processing	2-1-0	3	3
		CS0U41D	Python for Engineers	2-1-0	3	3
		CS0U41E	Object Oriented Concepts	2-1-0	3	3

SEMESTER VIII						
Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	PCC	CS2U40B	Generative AI	2-1-0	3	3
B	PEC	CS2UXXX	Programme Elective III	2-1-0	3	3
C	PEC	CS2UXXX	Programme Elective IV	2-1-0	3	3
D	PEC	CS2UXXX	Programme Elective V	2-1-0	3	3
T	PCC	CS2U40C	Comprehensive Course Viva	1-0-0	1	1
U	PWS	CS2U49C	Project Phase II	0-0-12	12	4
R/M/H	VAC		Remedial/Minor/HonoursCourse	0-1-6	7	4
TOTAL					**25/32**	**17/21**

PROGRAMME ELECTIVE III

Slot	Category Code	Course Number	Course	L-T-P	Hours	Credit
B	PEC	CS2U42A	AI For Cyber Security	2-1-0	3	3
		CS2U42B	Web Intelligence and Big Data	2-1-0	3	3
		CS2U42C	Cognitive Modelling	2-1-0	3	3
		CS2U42D	Image and Video Analytics	2-1-0	3	3
		CS1U42G	Computer Vision	2-1-0	3	3

PROGRAMME ELECTIVE IV

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
B	PEC	CS2U43A	Human Computer Interaction	2-1-0	3	3
		CS2U43B	Deep Learning for Signal & Image Processing	2-1-0	3	3
		CS2U43C	Artificial Intelligence for Robotics	2-1-0	3	3
		CS2U43D	Data Pre-processing and Feature Engineering	2-1-0	3	3
		CS2U43F	Introduction to Reinforcement Learning	2-1-0	3	3
		CS2U43G	Bio-Inspired Optimization Techniques	2-1-0	3	3
		CS2U43H	Text Mining	2-1-0	3	3

PROGRAMME ELECTIVE V

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
C	PEC	CS1U44A	High Performance Computing	2-1-0	3	3
		CS1U44B	Block Chain Technologies	2-1-0	3	3
		CS2U44A	Knowledge Engineering and Expert Systems	2-1-0	3	3
		CS2U44B	IoT for AI	2-1-0	3	3
		CS2U44C	Big Data and Database Management	2-1-0	3	3
		CS1U44F	Bioinformatics	2-1-0	3	3
		CS1U44G	Computational Linguistics	2-1-0	3	3

B. Tech (MINOR)

Semester	BASKET I SOFTWARE ENGINEERING				BASKET II MACHINE LEARNING				BASKET III NETWORKING			
	Course Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit
S3	CS0M 20A	Object Oriented Programming	3-1-0	4	CS0M 20B	Python for Machine Learning	3-1-0	4	CS0M 20C	Data Communication	3-1-0	4
S4	CS0M 20D	Programming Methodologies	3-1-0	4	CS0M 20E	Mathematics for Machine Learning	3-1-0	4	CS0M 20F	Introduction to Computer Networks	3-1-0	4
S5	CS0M 30A	Concepts in Software Engineering	3-1-0	4	CS0M 30B	Concepts in Machine Learning	3-1-0	4	CS0M 30C	Client Server Systems	3-1-0	4
S6	CS0M 30D	Introduction to Software Testing	3-1-0	4	CS0M 30E	Concepts in Deep Learning	3-1-0	4	CS0M 30F	Wireless Networks and IoT Applications	3-1-0	4
S7	CS0M 49A	Mini Project	0-1-6	4	CS0M 49A	Mini Project	0-1-6	4	CS0M 49A	Mini Project	0-1-6	4
S8	CS0M 49B	Mini Project	0-1-6	4	CS0M 49B	Mini Project	0-1-6	4	CS0M 49B	Mini Project	0-1-6	4

B. Tech (HONOURS)

Semester	BASKET I				BASKET II				BASKET III			
	SECURITY IN COMPUTING				COMPUTATIONAL BIOLOGY				COMPUTER VISION			
	Course Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit
S4	CS1H20A	Number Theory	3-1-0	4	CS2H20A	Computational Fundamentals for Bioinformatics	3-1-0	4	CS2H20B	Advanced Topics in Computer Graphics	3-1-0	4
S5	CS1H30A	Cryptographic Algorithms	3-1-0	4	CS2H30A	Computational Biology	3-1-0	4	CS2H30B	Advanced Concepts In Computer Vision	3-1-0	4
S6	CS1H30D	Network Security	3-1-0	4	CS2H30C	Machine Learning In Computational Biology	3-1-0	4	CS2H30D	Image And Video Processing	3-1-0	4
S7	CS1H40A	Cyber Forensics	3-1-0	4	CS2H40A	Computational Health Informatics	3-1-0	4	CS2H40B	Surveillance Video Analytics	3-1-0	4
S8	CS1H49A	Mini Project	0-1-6	4	CS2H49A	Mini Project	0-1-6	4	CS2H49A	Mini Project	0-1-6	4

BTech in Computer Science and Engineering (AI) 2022-2023