JOY UNIVERSITY

Established vide Tamil Nadu State Pvt. Universities Act 2019

SCHOOL OF COMPUTATIONAL INTELLIGENCE

Outcome Based Curriculum Framework with CBCS

for

BACHELOR OF TECHNOLOGY (ARTIFICIAL INTELLIGENCE & INTERNET OF THINGS)

(B. Tech. CSE - AI & IoT)

Students admitted from 2025 -26 onwards

JOY UNIVERSITY
semper paratus

VISION

♣ To create and nurture a multidisciplinary global university with highest academics, research and ethical standards in a creative and innovative environment.

MISSION

♣ To be a premier University of choice for all stakeholders and contribute for academic demographic dividend. To inculcate quality, integrity, team work, compassion, ethics in new generation students for catering to various needs of society.

QUALITY OBJECTIVES

- To disseminate knowledge with skills through teaching, training, seminars, workshops, conferences and symposia in Engineering and Technology, Art and Design, Management and Commerce, Allied Health Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences, Law and Agricultural Sciences to enable students to meet the current needs and trends of industries, business and society.
- To provide technical and scientific solutions to real time problems posed by industries, business and society in all Schools of Joy University.
- To inculcate quality, integrity, team work, compassion, ethics in new generation students for catering to various needs of society.
- To promote the spirit of entrepreneurship in the young generation to help and create more career opportunities in the society by incubating a nurturing technology product idea backed by Technology Business Incubation.
- To identify and nurture leadership and innovate skills in students to become future

leaders to enrich society.

- To develop collaborations and partnerships with International global and reputed Universities, research establishments, Government and NGO's, industries and businesses. To support both faculties and students for international exposure.

SCHOOL OF COMPUTATIONAL INTELLIGENCE

VISION

MISSION

PROGRAMME EDUCATIONAL OBJECTIVES

PEO 1: To ensure that the graduates will have the ability and attitude to acquire new skills and adapt recent technological changes.

PEO 2: To prepare the graduates to serve in the industries related to Computer Science with Artificial Intelligence and Internet of Things (AI and IoT) or to do higher education and research.

PEO 3: To ensure that the graduates will work with professionalism and ethics by contributing to the advancement of the society.

GRADUATE ATTRIBUTES

The Graduate Attributes of B. Tech CSE (AI and IoT) are:

Apply appropriate knowledge in the field of AI and IoT to identify, formulate, analyze, and solve complex engineering problems in order to reach substantive conclusions.

- Self-learn and engage in use of advanced computing tools related to AI and IoT.
- Develop sustainable computing solutions in broader economic, societal and environmental contexts.
- Think critically, creatively and analytically as a AI scientist, whilst being able to work effectively, independently and collaboratively as part of a team in research, technology development and entrepreneurial ventures.
- Apply evolving ethics and privacy laws across various domains and territories.
- Effectively communicate engineering concepts and ideas to peers in written or oral forms.

- Be motivated to engage in independent and life-long learning in the broadest context of evolving technological challenges.

PROGRAMME OUTCOMES

On completion of the **B. Tech CSE (AI and IoT) Programme,** students should be able to:

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 modelling 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: Design and build AI based IoT systems for various applications using analytical, logical and problem-solving skills.

PSO 2: Develop AI-powered software systems to activate, control and operate AI based IoT systems.

PSO 3: Apply IoT concepts with the help of AI to solve real-world problems in a variety of domains including industrial, communication, healthcare, military, etc.

Summary of Credits

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	19	20	21	21	21	23	17	24	166
Contact Hrs./ Week	22	22	24	24	24	27	22	9	174

SEMESTER WISE CREDIT STRUCTURE

Sl. No.	Category of Courses	1st Year		2nd Year		3rd Year		4th Year		Total
		Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Sem VII	Sem VIII	
1.	**Departmental Core**	8	8	18	18	18	15	8		**93**
2	**Departmental Electives**						03	6	06	**15**
3.	**Allied Schools Electives (Open Electives)**	3	2	3	3	3		3		**17**
4.	**Applied Sciences**	8	10							**18**
5.	**Seminar/ Internships/ Field Visits/ Independent Study/ Mini project**						2		--	**2**
6.	**Project**								15	**15**
7.	**Extra Academic Activity/ value added**						3		3	**6**
8.	**Humanities/ Recent Trends**									
Total Credits		**19**	**20**	**21**	**21**	**21**	**23**	**17**	**24**	**166**

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School of Computational Science

B. Tech CSE (Artificial Intelligence and IoT)

Semester – I
(Total Credits: 19)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTAI111	**Core Course / Major** Fundamentals of Computing	3	0	0	3	3
2.	25BTAI112	**Core Course / Major** Introduction to Programming	3	0	0	3	3
3.	25BTAI113	**Core Course/ Allied** Mathematics I	3	1	0	3	4
4.	25BTAI114	**Core Course/ Applied Science** Physics I	3	1	0	3	4
5.	25AEEN811	**Ability Enhancement Compulsory Course (AECC)** Effective Communication	3	0	0	3	3
6.	25BTAI911	**Value-Added Course** Performing Arts/Sports (Non-Graded)	3	0	0	3	0
7.	25BTAI211	**Core Course / Major** Fundamentals of Computing Lab	0	0	2	2	1
8	25BTAI212	**Core Course / Major** Introduction to Programming Lab	0	0	2	2	1
		Total	**18**	**2**	**4**	**22**	**19**

Semester – II

(Total Credits: 20)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTAI121	**Core Course** Python Programming	3	0	0	3	3
2.	25BTAI122	**Core Course - Allied** Probability, Statistics and Stochastic Processes	3	0	0	3	3
3.	25BTAI123	**Core Course – Allied** Mathematics II	3	1	0	4	4
4.	25BTAI124	**Core Course – Applied Science** Physics II	3	0	0	3	3
5.	25BTAI125	**Core Course – Allied** Discrete Structures for Computer Science	3	0	0	3	3
6	25EVST921	**Value Added Course** Environmental Science	2	0	0	2	2
7	25BTAI221	**Core Course** Python Programming Lab	0	0	2	2	1
8	25BTAI222	**Core Course** Physics II Lab	0	0	2	2	1
		TOTAL	**17**	**1**	**4**	**22**	**20**

Semester – III

(Total Credits: 21)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTAI131	**Core Course** Introduction to AI & ML	3	0	0	3	3
2.	25BTAI132	**Core Course** IoT Fundamentals	3	0	0	3	3
3	25BTAI133	**Core Course** Digital Design	3	0	0	3	3
4	25BTAI134	**Core Course** Data Structures and Algorithms	3	0	0	3	3
5	25BTAI135	**Core Course** Object-Oriented Programming	3	0	0	3	3
6		**Open Elective I** Professional Ethics	3	0	0	3	3
7	25BTAI231	**Core Course** Digital Design Lab	0	0	2	2	1
8	25BTAI232	**Core Course** Data Structures and Algorithms Lab	0	0	2	2	1
9	25BTAI233	**Core Course** Object-Oriented Programming Lab	0	0	2	2	1
		TOTAL	**18**	0	**6**	**24**	**21**

Semester – IV

(Total Credits: 21)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTAI141	**Core Course** Human-Computer Interaction and Intelligent Interfaces	3	0	0	3	3
2.	25BTAI142	**Core Course** Embedded Systems / IoT Protocols	3	0	0	3	3
3.	25BTAI143	**Core Course** Design and Analysis of Algorithms	3	0	0	3	3
4.	25BTAI144	**Core Course** Computer Organization	3	0	0	3	3
5	25BTAI145	**Core Course** Machine Learning	3	0	0	3	3
6		**Open Elective III** Engineering Economics and Foreign Trade	3	0	0	3	3
7	25BTAI241	**Core Course** Computer Networks Laboratory	0	0	2	2	1
8	25BTAI242	**Core Course** Algorithm Design	0	0	2	2	1
9	25BTAI243	**Core Course** Embedded Systems and IoT Protocols Laboratory	0	0	2	2	1
		TOTAL	**18**	**0**	**6**	**24**	**21**

Semester – V

(Total Credits: 21)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1	25BTAI151	**Core Course** Deep Learning	3	0	0	3	3
2	25BTAI152	**Core Course** Computer Networks	3	0	0	3	3
3	25BTAI152	**Core Course** Microcontrollers & IoT Devices	3	0	0	3	3
4	25BTAI154	**Core Course** Artificial Neural Networks	3	0	0	3	3
5	25BTAI155	**Core Course** Data Analytics / Big Data	3	0	0	3	3
6		**Open Elective – IV** Principles of Management	3	0	0	3	3
7	25BTAI251	**Core Course** Computer Networks Lab	0	0	2	2	1
8	25BTAI252	**Core Course** Microcontrollers & IoT Devices lab	0	0	2	2	1
9	25BTAI253	**Core Course** Data Analytics & Big Data Lab	0	0	2	2	1
		TOTAL	18	0	6	**24**	**21**

Semester – VI

(Total Credits: 26)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTAI161	**Core Course** Reinforcement Learning / NLP	3	0	0	3	3
2.	25BTAI162	**Core Course** Cloud & Edge Computing for IoT	3	0	0	3	3
3.	25BTAI163	**Core Course** Industrial Electronics and Power Convertors	3	0	0	3	3
4.	25BTAI164	**Core Course** Robotics and Intelligent Automation	3	0	0	3	3
5.		**Discipline Specific Elective – I**	3	0	0	3	3
6	25BTAI261	**Core Course** Reinforcement Learning & NLP Lab	0	0	2	2	1
7	25BTAI262	**Core Course** Cloud & Edge Computing for IoT Lab	0	0	2	2	1
8	25BTAI263	**Core Course** Robotics and Intelligent Automation Lab	0	0	2	2	1
9		Minor Project – II (AI/IoT Based)					2
10		**Value Added Course** Extended Reality and its Applications (from TANSAM)	0	0	3	3	3
		TOTAL	**18**	0	**9**	**27**	**23**

Semester – VII

(Total Credits: 17)

SI. No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1	25BTAI171	Cybersecurity for IoT	3	0	0	3	3
2	25BTAI172	IoT with 5G	3	0	0	3	3
3		**Discipline Specific Elective – II**	3	0	0	3	3
4		**Discipline Specific Elective – III**	3	0	0	3	3
5		**Generic Elective I**	3	0	0	3	3
6	25BTAI271	Cybersecurity for IoT Lab	0	0	2	2	1
7	25BTAI271	IoT with 5G Lab	0	0	2	2	1
		TOTAL	**18**	**0**	**4**	**22**	**17**

Semester – VIII

(Total Credits: 24)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1	25BTAI581	Capstone Project/ Startup Incubation	0	0	3	3	15
2		**Discipline Specific Elective – II**	3	0	0	3	3
3		**Discipline Specific Elective – III**	3	0	0	3	3
4		MOOC / SWAYAM / NPTEL Credit Transfer (3 credits for 12 week course and 2 credits for 8 week courses)	0	0	0	0	3
		TOTAL:	**6**	**0**	**3**	**9**	**24**

Discipline Specific Electives I

Sl. No.	Course Code	Course Title	L	T	P	Contact Hrs/ Wk	Credits
1	25BTAI081	Natural Language Processing (NLP)	3	0	0	3	3
2	25BTAI082	Computer Vision	3	0	0	3	3
3	25BTAI083	Industrial IoT	3	0	0	3	3
4	25BTAI084	AI Ethics / AI & Society	3	0	0	3	3

Discipline Specific Electives II

Sl. No.	Course Code	Course Title	L	T	P	Contact Hrs/ Wk	Credits
1	25BTAI085	Explainable AI	3	0	0	3	3
2	25BTAI086	Generative AI	3	0	0	3	3
3	25BTAI087	Smart City Technologies	3	0	0	3	3
4	25BTAI088	Fuzzy Logic & Expert Systems	3	0	0	3	3
5	25BTAI089	Ethics and Fairness in AI	3	0	0	3	3

Discipline Specific Electives III

Sl. No.	Course Code	Course Title	L	T	P	Contact Hrs/ Wk	Credits
1		Sensor Networks	3	0	0	3	3
2		Real-Time OS	3	0	0	3	3
3		Wearable Technologies	3	0	0	3	3
4		Computer Vision	3	0	0	3	3

Open Electives

Slno.	Course Code	Course Title	Credits
1		Professional Ethics	2
2		Indian Constitution	
3		Engineering Economics and Foreign Trade	
4		Principles of Management	

Programme	B.TECH CSE (AI& IoT)	Programme Code	BTAI
Course Code	BTAI1111	Number of Hours/Week	3
Semester	I	Max. Marks	100
Year	I	Credits	3

Course

Course Title	FUNDAMENTALS OF COMPUTING	L	T	P
		3	0	0

L-Lecture Hours T-Tutorial Hours P-Practical Hours

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

- To have a comprehensive understanding of a foundational understanding of computersystems.
- To learn about various number systems including decimal, binary, octal, and hexadecimal
- To develop a comprehensive grasp of how computers function, the types of software used and the significance of networking in today's digital world.
- To explore various types of software applications including operating systems, word processors, database management systems and Internet

UNIT	TOPICS	HOURS
I	**Introduction to Computer** Evolution of Computers, Generations of Computers, Classification of Computers, The Computer System, Computing Concepts, Applications of Computers. **Memory and storage systems** Computer Software and Hardware components and its requirements- Storage Devices, **Computer Viruses** Types Of Viruses – Spreading of Virus, Prevention of Computer Virus, Virus Detection, Computer Security, Maintenance, Desktop functions, Dialog boxes, Single Document Interface (SDI), Multiple Document Interface (MDI), Windows Controls, Main Menu Display, Categories of Menus, Main and Context Sensitive Menus, Booting/Shutting Down.	12
II	**Microsoft software** MS DOS, MS Word System, MS Excel System, MS Power point System, MS Access System, MS Publisher. **Number System** Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, BCD, XS,3, Gray Code, Alphanumeric Codes,(ASCII, EBCDIC).	12

III	**Computer Software** Machine language, Mnemonics, High level Language, Assembler, Compiler, Interpreter, System Development Programs, System Management Programs, Standard Application Programs, UniqueApplication Programs, Problem Solving, Structuring the Logic.	**12**
IV	**Memory management** Introduction, History, Functions, Process, Memory File, Management Device, Security Management, Types of Operating Systems, Providing User Interface, Popular Operating Systems.	**12**

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1: Understand the basic concepts of computers.

CO2: Analyze the basics of number systems.

CO3: Apply system development programs to create and manage simple software projects.

CO4: Analyze the performance of different memory management techniques and their impact on system efficiency.

CO5: Evaluate the knowledge of Internet history to understand current Internet technologies and to solve problems in communication and information access.

Text Book:

1. Fundamentals of Computers, E.Balagurusamy, Tata McGraw Hill Education Private Limited, 2009.

Reference Books:

1. Introduction to Computer Fundamentals, Bright Siaw Afriyie, Second edition, Trafford Publishing, Canada, 2003-2006.
2. Computer Fundamentals, P. K. Sinha, BPB Publications, Sixth Edition.
3. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Wiley publishers, Nineth edition, 2013.
4. Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, Fifth edition, Prentice Hall, 2011.
5. Computing Fundamentals: Introduction to Computers, Faithe Wempen, Wiley 2014.

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1	Understand the basic functionalities of Microsoft Word
CO2	Apply advanced Excel features for data management.
CO3 :	Create complex data presentations using Excel pivot tables, charts, and slicers.
CO4	Develop professional presentations using advanced PowerPoint features.
CO5	Design and develop basic web pages using HTML

Mapping of CO's with PO's and PSO's (Articulation Matrix)

	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	0	1	1	0	0	0	2	0	0	0	1	3	2	0	0
CO2	3	3	0	2	3	0	0	0	0	0	1	3	2	0	0
CO3	3	3	3	2	2	0	0	0	0	0	3	3	2	1	1
CO4	2	3	1	3	2	0	0	0	0	0	1	3	2	1	1
C05	3	3	2	3	3	0	0	0	0	0	1	3	2	1	1

3 – high, 2 – Average, 1 - low , 0-null

Programme	B.TECH CSE (AI&IoT)	Programme Code	BTAI
Course Code	BTAI 1112	Number of Hours/Week	3
Semester	I	Max. Marks	100
Year	I	Credits	3

Core course

Course Title	INTRODUCTION TO PROGRAMMING LANGUAGE	L	T	P
		3	0	0

COURSE OBJECTIVES:

The main aim of this course is to prepare the students for:

- To learn the fundamental concepts of programming, including algorithms, flowcharts, and the logical approach to problem solving that is applicable to any programming language.
- To acquire comprehensive understanding of the syntax, semantics and the basic constructs of C language.
- To learn using arrays, pointers, and dynamic memory allocation which are key to understanding data structure and memory management.
- To build a foundation for advanced programming and software development.
- To develop skills to handle complex programming challenges such as file handling, debugging.

UNIT	TOPICS	HOURS
I	**Introduction to programming** Algorithm, Formalism, Flow chart,Assembly language, Introduction to program, Program components, structure, Execution path, Programming paradigms introduction, Syntax and Semantics	12
II	**Introduction to C language** History of C, Prerequisites of C, Features and its applications, Structure of C, Preprocessor directives, Data types and constants, variables and its types, Tokens, Identifiers and format specifiers, Operators and Enums, Data I/O, Decision making and Branching, Loop Introdcution, programs with looping structure, Control Flow programs with control flow	12
III	**Array and Strings** Introduction to Array, Initialization, Single dimensional array, Multidimensional array, String, Functions with string: Read, Display string and string functions, String Arrays.	12

IV	**Functions and Pointers** Function Introduction, Function calling, Return type, Function types, Recursion, Types of Recursion, Introduction to Pointers, Types Pointers, Programming exercises with pointers.	**12**
V	**Structures and Unions** Introduction to structure and simple programusing structure concepts, Introduction to Union and programs with union, Storage Classes- Introduction to DMA, Introdcution to Pre-processor	**12**

Andragogy

Class Room Lectures, Power point presentation, You Tube, Group Discussion, Seminar, Quiz,Formative Assessments, Brain storming, Activity

COURSE OUTCOMES:

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CO1	0	1	1	0	0	0	2	0	0	0	1	3	2	0	0
CO2	3	3	0	2	3	0	0	0	0	0	1	3	2	0	0
CO3	3	3	3	2	2	0	0	0	0	0	3	3	2	1	1
CO4	2	3	1	3	2	0	0	0	0	0	1	3	2	1	1
C05	3	3	2	3	3	0	0	0	0	0	1	3	2	1	1

3 – high, 2 – Average, 1 - low , 0-null

Programme	B.TECH CSE (AI & IoT)	Programme Code	BTAI
Course Code	BTAI1113	Number of Hours/Week	4
Semester	I	Max. Marks	100
Year	I	Credits	4

Core Course

Course Title	MATHEMATICS -I	L	T	P
		3	1	0

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

- To recall and remember basics of matrices, complex numbers, and differential calculus.
- To understand the concepts of basic mathematical methods for matrices, complex numbers and differential calculus.
- To apply methods to solve engineering problems.
- To analyze engineering problems and evaluate.
- To solve and evaluate the problems using matrices, complex numbers, and differentialcalculus.

UNIT	TOPICS	HOURS
I	**Introduction to Differentiation and its applications:** Fundamentals of Differentiation, Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders, Indeterminate forms and L'Hopital's rule, Maxima and Minima	10
II	**Integration and its applications:** Double integral, Triple integral, Change of order of integration, Change of variables, Beta and Gamma functions and their properties, Dirichlet's integral and its applications to area and volume, Liouville's extensions of Dirichlet's integral.	12
III	**Sequence:** Real number system, Convergence of sequence and series, Tests for convergence	8
IV	**Series:** Power series, Taylor's series, Series for exponential,trigonometric and logarithm functions, Fourier series: Half range sine and cosine series, Parseval's theorem.	8
V	**Advanced Multivariable Calculus:** Limit, continuity and partial derivatives, Directional derivatives, Total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers, Gradient,curl and divergence	10
VI	**Advanced Matrix Theory**: Introduction, types of matrices-symmetric, skew-symmetric, Hermitian, skew-Hermitian, orthogonal, unitary matrices, Rank of a matrix - echelon form, normal form, consistency of system of linear equations (Homogeneous and Non-Homogeneous).Inverse and rank of a matrix, rank-nullity theorem	12

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1:	Understand the concepts of mean value theorems, higher order derivative, series expansion and associated problems
CO2:	Acquire problem solving skills for finding area and volume using multiple integrals
CO3:	Analyze sequences and series, including Fourier series
CO4:	Apply the differentiation of functions of two variables for maximization and minimization
CO5:	Evaluate basic matrix operations, linear systems of equations

Text Books

1: Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition, Wiley, 2020.

2: Calculus and Analytical Geometry, Thomas and Finney, 9th Edition, Pearson, 2010.

3: Engineering Mathematics-I, Veerarajan T., Tata McGraw-Hill, New Delhi, 2008.

4: Higher Engineering Mathematics, Ramana B.V., 11th Reprint, Tata McGraw-Hill, New Delhi, 2010.

Reference Books

1: Higher Engineering Mathematics, B.S. Grewal, 36th Edition, Khanna Publishers, 2010.

2: Principles of Mathematical Analysis, W. Rudin, 3rd Edition, McGraw-Hill, 197

Mapping of CO's with PO's and PSO's (Articulation Matrix)

	PO 1	PO2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	2	1	0	1	0	0	0	1	0	0	0	2	1	1
CO2	3	2	1	1	2	0	0	0	1	0	0	0	1	1	0
CO3	2	3	2	0	1	0	0	0	1	0	0	0	1	0	1
CO4	2	2	2	2	2	0	0	0	1	0	0	0	2	1	0
CO5	3	2	1	1	2	0	0	0	1	0	0	0	0	2	2

Programme	**B.TECH CSE (AI&IoT)**	**Programme Code**	**BTAI**
Course Code	**BTAI 1114**	**Number of Hours/Week**	**4**
Semester	**I**	**Max. Marks**	**100**
Year	**I**	**Credits**	**4**

Course Title	**Physics I**	**L**	**T**	**P**
		3	**1**	**0**

L-Lecture Hours T-Tutorial Hours P-Practical Hours

COURSE OBJECTIVES:

- To impart knowledge on the basics of the vector and scalar representation of forces and moments with Special reference to differentiation and integration methods
- To acquire knowledge on moment of inertia and angular momentum
- To impart knowledge on the concept of central force problems and uniformly accelerating systems.

UNIT	**TOPICS**	**HOURS**
I	Algebra of vectors-Describing motion: displacement, velocity, speed, acceleration; Cartesian, polar, spherical, and cylindrical polar coordinates; Mathematical tools- differentiation and integration methods, Taylor's series	**12**
II	Concept of inertia; concept of inertial and non-inertial frames; Newton's laws of motion; Application of Newton's laws: particles in gravitational field, simple harmonic motion, tension in a string, frictional force, viscous force, damped harmonic oscillator, forced harmonic oscillator and resonance. Concept of momentum- center of mass, conservation of momentum, momentum and flow of mass, work-energy theorem, conservative and non-conservative forces, conservation of energy, concept of power, conservation laws and particle collisions	**12**
III	Concept of moment of inertia; fixed axis rotation; angular displacement, angular velocity, and angular acceleration; vector nature of angular velocity; angular momentum; torque; conservation of angular momentum; gyroscope motion	**12**
IV	Central forces; central force motion as one-body problem; conservation laws in central forcemotion; Kepler's laws	**12**

V	Galilean transformations; uniformly accelerating systems; principle of equivalence; Physics in rotating coordinate systems	**12**

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1: Apply the concepts of polar, rectangular, cylindrical and spherical coordinate systems.

CO2: Ability to differentiate statics and kinematics.

CO3: Demonstrate the ability to solve the problems in Newton's laws.

CO4: Appreciate to understand rotational kinetic energy & angular momentum.

CO5: Acquire adequate knowledge on conservation laws.

Text Books:

1. An Introduction to Mechanics by Daniel Kleppner, Robert Kolenkow

Reference Books:

1. Mechanics: Course of Theoretical Physics - Vol. 1, L.D.
2. 2. Landau and E.M. Lifshitz, ThirdEdition, CBS Publishers

	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
CO 1	2	3	0	0	0	0	0	0	0	0	0	2	0	1	2
CO 2	2	0	0	1	0	0	0	0	0	0	0	0	0	1	2
CO 3	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2
CO 4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
C0 5	2	2	0	0	0	0	0	0	0	0	0	0	0	2	0

3 – high, 2 – Average, 1 - low , 0-null

Programme	**B.TECH CSE (AI&IoT)**	**Programme Code**	**BTAI**
Course Code	**BTAI 1115**	**Number of Hours/Week**	**3**
Semester	**1**	**Max. Marks**	**100**
Year	**1**	**Credits**	**3**

Course Title	**EFFECTIVE COMMUNICATION**	**L**	**T**	**P**
		3	**0**	**0**

0L-Lecture Hours T-Tutorial Hours P-Practical Hours

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students to

- To define and explain the fundamental concepts, types, and processes of communication.
- To develop active listening and effective speaking skills to enhance interpersonal communications.
- To improve reading comprehension skills through different techniques.
- To apply grammar and vocabulary rules and public communication for accurate sentence structure and effective written communication.
- To prepare and deliver effective presentations by planning, structuring, and overcoming stage fright.

UNIT	TOPICS	HOURS
I	**Introduction to Communication** Definition of Communication, Types of Communication: Formal, Informal, Oral, Written, Verbal, non-verbal, interpersonal, intrapersonal Process of Communication: Sender, Message, Channel, Receiver, Feedback Barriers: Intrapersonal, Interpersonal,	10
II	**Listening and Speaking:** Active Listening: Types of Listening, Reasons for poor listening Traits of the good listener, Effective Speaking: Achieving Confidence, Clarity, and Fluency, Public Speaking, Drafting the Speech	10
III	**Reading and Writing:** Reading Comprehension**:** Improving Comprehension Skills, Scanning and Skimming, Predicting the Content, Understanding the Gist, PQRST Technique Grammar and Vocabulary**:** Sentence Structure, Preposition, Punctuation, Articles, Common errors and Correct Usage, Word formation: Affixes, Active and Passive Vocabulary	13

IV	**Presentation Skills** Planning: Occasion, Audience, Purpose, Thesis Statement, Material, Outlining and Structuring, Guidelines for Effective Delivery, Strategies for Reducing Stage Fright	**8**
V	**Practice:** Grammar Bites, English Fluency Drills	**4**

COURSE OUTCOMES:

CO1: Analyse different types and processes of communication and the barriers that may arise.

CO2: Demonstrate active listening skills and strategies for confident and fluent public speaking.

CO3: Improve reading comprehension through effective reading techniques.

CO4: Apply proper grammar, sentence structures, and vocabulary for clear and correct written communication.

CO5: Create structured presentations, incorporating techniques to manage stage fright and engage the audience effectively.

Text Books

1. Kumar, Sanjay and Pushp Lata. *Communication Skills*. 2nd ed., Oxford University Press,2015.
2. Raman, Meenakshi and Sangeetha Sharma. *Technical Communication: Principles andPractice*, 4th ed., Oxford University Press, 2022.

Reference Books

1. Adair, John. *Effective Communication: The Most Important Management Skill of All.* Pan Books Publishers, 1997.
2. Gorrell, Robert M and Charlton Laird. *Modern English Handbook*. 6th ed., Pentice HallPublications, 1976.
3. Rose, William. *GNVQ Core Skills Communication*. 2nd. ed., Pitman Publishing, 1995.

Mapping of CO's with PO's and PSO's (Articulation Matrix)

	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
CO 1	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0
CO 2	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0
CO 3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
CO 4	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
CO 5	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0

3 – high, 2 – Average, 1 - low , 0-null

Programme	B.TECH CSE (AI&IoT)	Programme Code	BTAI
Course Code	BTAI 1116	Number of Hours/Week	2
Semester	I	Max. Marks	100
Year	I	Credits	1

FUNDAMENTALS OF COMPUTING LAB	L	T	P
	0	0	2

LIST OF PROGRAMS

1. Basics of Microsoft Word.
2. Insert Table and Generating Chart.
3. Mail Merging.
4. Study on features of Microsoft Excel.
5. Incorporating the predefined functions in Excel.
6. Inserting table and generating chart in Excel.
7. Pivot chart, table and slicing in Excel.
8. Study on features in Microsoft PowerPoint.
9. Creating presentation incorporating the features of PowerPoint.
10. Study on HTML.
11. Basic web page design, formatting, inclusion of image and video.
12. Creation of Table.
13. Designing own web page.

Mapping of CO's with PO's and PSO's (Articulation Matrix)

	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
CO 1	0	1	1	0	0	0	2	0	0	0	1	3	2	0	0
CO 2	3	3	0	2	3	0	0	0	0	0	1	3	2	0	0
CO 3	3	3	3	2	2	0	0	0	0	0	3	3	2	1	1
CO 4	2	3	1	3	2	0	0	0	0	0	1	3	2	1	1
C0 5	3	3	2	3	3	0	0	0	0	0	1	3	2	1	1

3 – high, 2 – Average, 1 - low , 0-null

Programme	**B.TECH CSE (AI&IoT)**	**Programme Code**	**BTAI**
Course Code		**Number of Hours/Week**	**2**
Semester	**I**	**Max. Marks**	**100**
Year	**I**	**Credits**	**1**

INTRODUCTION TO PROGRAMMING LAB	**L**	**T**	**P**
	0	**0**	**2**

LIST OF PROGRAMS

1. Write a C program to print Integer, Float, Character values

2. a)Write a c program to demonstrate use of arithmetic operators
2. b)Write a C program using increment and decrement operators
3. a)Write a C program using Decision making constructs (Switch case statement)
3.b) Program to find if a number is Negative, Positive, or zero(using if..elseif..else statement)
4. C program to perform factorial of a number
5. a) Write a C program to print a message 5 times using"while" statement
5.b) Illustrate the Do-while statement using C program
5. c)Program using for loop statement
6. a) Program to implement break statement
6. b) write a program to demonstrate continue statement
7. Program to insert elements into an array and display the array elements using C language
8. Program to solve multiplication of 2 matrices
9. String
   a) Program to accept a string and display it as reverse using C language
   b) program to concatenate 2 string using C
10. Array
   a) Program to illustrate the concepts of arrays
   b) Program to illustrate pointer to 2-dimensional array
11. Program to take mark details of students and display the name of the students with highest marks using Structure concept
12. Program to implement union concept.

Mapping of CO's with PO's and PSO's (Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1	0	0	0	0	1	3	0	0	0
CO2	3	3	0	0	0	0	1	0	0	0	0	3	1	0	0
CO3	3	2	2	0	0	1	1	0	0	0	0	3	0	1	1
CO4	3	2	2	0	0	0	0	0	0	0	0	3	1	0	1
C05	3	3	2	2	2	0	0	0	0	0	0	3	3	0	1

3 – high, 2 – Average, 1 - low , 0-null

——————————————**" I st Semester Ends"** ——————————————

SEMESTER-II

Programme	**B.TECH CSE (AI&IoT)**	**Programme Code**	**BTAR**
Course Code	**BTAI1121**	**Number of Hours/Week**	**3**
Semester	**II**	**Max. Marks**	**100**
Year	**I**	**Credits**	**3**
Course			
Course Title	**PYTHON PROGRAMMING**	**L**	**T** / **P**
		3	**0** / **0**

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

- To Understand the fundamentals of the Python programming language and its historical development
- To Master Python basics, including data types, operators, tuples, dictionaries, and string manipulation.
- To demonstrate object oriented concept in python
- To familiarize with machine learning tools in python

UNIT	TOPICS	HOURS
I	**Introduction to python programming** Introduction to python ; setting up python programming environment; variables; strings and its operations; special characters; striping whitespace; numbers; comments; list and its operations; indexing; looping through lists; indentation; range function; slicing a list; copying list; looping through slice	**8**
II	**Python datatypes** Tuples and its operations; relational operators; conditional statements – if, if-else, if-elif-else; multiple conditional blocks; dictionaries; key-value pairs – adding, modifying, removing; looping through dictionary; list of dictionaries; dictionary in a dictionary; user input function; type casting	**8**

III	**Loop and function** While loop; break and continue; functions; arguments; passing arguments – positional arguments, keyword arguments, default values; optional arguments; returning from function; passing arbitrary number of arguments; storing functions in modules; import specific function or module	**8**
IV	**OOPs in python** Classes; init() method; instance of a class; accessing attributes; calling methods; creating multiple instances; inheritance – parent class, child class; importing classes; files – reading a file, writing to a file, appending to a file; exceptions – try-except block, else block	**8**

V	**Python machine learning tools** Python tools for machine learning; python modules – numpy, pandas, matplotlib, scipy; python based machine learning libraries – pytorch, tensorflow; virtual environment; machine learning application using python tools.	**8**

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1 : Comprehend the holistic view of programming language design and behavior

CO2 : Understand the programming concepts in abstract and paradigm level

CO3 : Structure python programs for solving problems

CO4 : Develop python programs using OOP concept

CO5 : Execute ML project using python tools

Text Book:

1. Eric Matthes. Python Crash Course, 2nd Edition: A Hands-On, Project-Based Intro- duction toProgramming. No Starch Press, Inc., 2019.

Reference Book:

1. Al Sweigart. AutomAte the Boring Stuff with Python. William Pollock, 2015.

Mapping of CO's with PO's and PSO's (Articulation Matrix)

	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	1	3	0	0	1	0	1	0	1	0	2	1	0	0
CO_2	3	3	2	3	1	2	0	2	1	1	0	2	3	2	0
CO_3	3	2	3	2	3	1	1	0	0	1	0	2	3	2	1
CO_4	3	2	3	2	1	2	1	0	1	1	0	1	3	2	2
CO_5	2	2	3	3	3	0	1	3	1	1	1	1	3	2	2

3 – high, 2 – Average, 1 - low , 0-null

Programme	**B.TECH CSE (AI& IoT)**	**Programme Code**	**BTAI**
Course Code	**BTAI1122**	**Number of Hours/Week**	**4**
Semester	**II**	**Max. Marks**	**100**
Year	**I**	**Credits**	**4**

Core Cou

Course Title	**Probability, Statistics and Stochastic Processes**	**L**	**T**	**P**
		3	**1**	**0**

COURSE OBJECTIVES:

- **Understand fundamental probability concepts** and their applications in real- world scenarios.
- Analyze data using descriptive statistics **such as mean, variance, and standard deviation.**
- Apply probability distributions **(e.g., binomial, normal) to model and solve problems.**
- Conduct hypothesis testing and confidence intervals **to make informed statistical inferences.**
- Utilize statistical tools and software **for data analysis and decision-making in various fields.**

UNIT	TOPICS	HOURS
I	**Introduction to Probability:** Introduction to set algebra-sigma algebra-Borel sigma algebra-sequence of sets and its limits-lim-sup and lim-inf of sequence of sets; Axiomatic definition of probability- probability space-properties of probability functions-conditional probability-Bayes' rule-independence of events-continuity of probability functions-Borel Cantelli lemmas.	**10**
II	**Random variables**-distribution function and its property probability mass and density functions-symmetric distribution and its properties- expectation-moments moment generating function-Markov inequality- Chebyshev's inequality.	**6**
III	**Joint distributions**-marginal and conditional distributions- moments-independence of random variables-covariance, and correlation joint moment generating functions-additive properties of random variables-functions of random variables-ordered Statistics.	**8**

IV	**Special distributions**: Discrete uniform-Bernoulli-binomial- geometric negative binomial-hypergeometric-Poisson-exponential- gamma-normal-bivariate normal distribution; Population- sample- parameters-distributions of the sample mean and the sample variance for a normal population-Chi-Square-t, F distributions-law of large numbers–central limit theorem-point estimation-method of moments-maximum likelihood estimator-unbiasedness.	**8**
V	**Testing of hypothesis**: Null and alternate hypothesis-Neyman Pearson fundamental lemma and its applications-tests for one sample and two sample problems for normal populations-tests for proportions-confidence interval estimation-confidence interval for parameters of normal population.	**10**

COURSE OUTCOMES:

On successful completion of this course, the student will be able to:

CO1:	Understand Basic Probability Concepts
CO2:	Analyze Random Variables and Probability Distributions, Joint Distributions and ConditionalProbability
CO3:	Implement the Central Limit Theorem and Law of Large Numbers
CO4:	Perform Hypothesis Testing and Statistical Inference, Regression and Correlation for Data AnalysisCO5: Employ Statistical Tools in Engineering Applications
CO5:	Understand the concepts of testing of hypothesis

Text Books:

1: First Course in Probability, Sheldon Ross, 9th Edition, Pearson Education, 2019.

2: An Introduction to Probability and Statistics, V.K. Rohatgi and A.K. Md. E. Saleh, 2nd Edition, Wiley,2008.

Reference Books:

1: Introduction to Probability and Statistics, S. Milton and J.C. Arnold, 4th Edition, McGraw-Hill, 2002.

th

2: Introduction to Mathematical Statistics, R V Hogg, A Craig and J W McKean, 8 Edition, Pearson, 2018.

Mapping of Course Outcomes (COs) with PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	0	1	0	0	0	0	0	0	2	2	1	1
CO	2	1	1	2	1	2	1	0	1	2	1	2	1	2	1
CO	2	0	2	2	2	2	2	1	1	2	0	0	2	0	2
CO	2	2	1	2	0	2	2	1	0	0	1	1	2	2	2
Co5	2	2	0	2	1	2	2	2	1	1	2	2	0	0	2

3 – High, 2 – Average, 1 - low, 0-null

Programme	B.TECH CSE (AI& IoT)	Programme Code	BTAI
Course Code	BTAI1123	Number of Hours/Week	4
Semester	II	Max. Marks	100
Year	I	Credits	4
Core Course			
Course Title	Mathematics II	L T P	3 1 0

COURSE OBJECTIVES:

- To develop a strong understanding of vector spaces, subspaces, basis, and dimension, as well as how linear transformations relate to matrices and their properties.
- To gain proficiency in solving systems of linear equations using techniques like Gaussian elimination, matrix operations, and determinants.
- To compute eigenvalues and eigenvectors, and apply them to diagonalize matrices, a critical tool for solving differential equations.
- To solve first-order and second-order ordinary differential equations (ODEs) with applications to physical, biological, and engineering problems.
- To understand the interplay between linear algebra and differential equations, especially in systems of linear differential equations, using matrix methods such as the Laplace transform and matrix exponentials.

UNIT	TOPICS	HOURS
I	**Advanced Matrix Theory: Systems of linear equations**: Elementary operations-row-reduced echelon matrices-Gauss elimination LU factorization-linear independence-rank of a matrix-solutions of linear systems-existence and uniqueness.	10
II	**Vector spaces**: Vector space-subspaces-spanning space-bases and dimensions. Linear transformation-matrix representations of linear transformations-range space and rank-null space and nullity-the rank and nullity theorem-invertibility.	6
III	**Eigenvalues and eigenvectors**: Eigen values-eigenvectors and some applications of eigenvalue problems-Hermitian, skew-Hermitian,unitary matrices and their eigenvalues-eigen bases.	8
IV	**Elementary Canonical Forms:** Diagonalization: Annihilating polynomial-the minimal polynomial and the characteristic polynomial-Cayley-Hamilton theorem-real quadratic form; Inner product spaces: Inner product spaces-orthonormal bases- Gram-Schmidt process.	8

V	**Ordinary Differential Equations**: Review of First Order ODE-Lipschitz condition-Picard`s theorem; Linear differential equations: Linear dependence and Wronskian-linear ODE with constant coefficients of higher order characteristic equations- Cauchy-Euler equations-method of undetermined coefficients-method of variation of parameters- solutions methods using Laplace Transform.	**10**

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

- Learn different types of matrices, concept of rank, methods of matrix inversion and their applications, systems of linear equations, and manipulate vectors in various dimensions.
- Understand linear spaces, its basis and dimension with corresponding applications in the field of computer science.
- Apply the concept of eigen values, eigen vectors, diagonalisation of matrices and orthogonalization in inner product spaces for understanding physical and engineering problems.
- Understand the first- and second-order ordinary differential equations (ODEs), both analytically and numerically, with applications to real-world phenomena.
- Develop the skills to model physical systems using differential equations and linear algebra.

Text Books:

1: Linear Algebra, Hoffman Kunze, 2nd Edition,

Prentice Hall, 2015.2: Differential Equations, S. L

Ross, 3rd Edition, Wiley, 2007.

Reference Books:

1: Introduction to Linear Algebra, Gilbert Strang, 5th Edition, Wellesley-

Cambridge Press,2016.

2: Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition, Wiley, 2020.

Mapping of Course Outcomes (COs) with PSOs -AI & ML

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	0	1	0	0	0	0	0	0	2	2	1	1
CO	2	1	1	2	1	2	1	0	1	2	1	2	1	2	1
CO	2	0	2	2	2	2	2	1	1	2	0	0	2	0	2
CO	2	2	1	2	0	2	2	1	0	0	1	1	2	2	2
Co5	2	2	0	2	1	2	2	2	1	1	2	2	0	0	2

3 – High, 2 – Average, 1 - low, 0-null

Programme	**B.TECH CSE (AI & IoT)**	**Programme Code**	**BTAI**
Course Code	**BTAI1124**	**Number of Hours/Week**	**4**
Semester	**II**	**Max. Marks**	**100**
Year	**I**	**Credits**	**3**

Course

Course Title	**Physics II**	**L**	**T**	**P**
		3	**0**	**0**

L-Lecture Hours T-Tutorial Hours P-Practical Hours

COURSE OBJECTIVES:

- To understand the working principle of various lasers, fibre optics and its applications.
- To impart knowledge on acoustics and ultrasonics and its applications.
- To provide knowledge on magnetism and superconducting phenomenon.

UNIT	**TOPICS**	**HOURS**
I	Introduction – Components of laser – Principle of laser action – Properties of laser – Spontaneous emission and stimulated emission – Einstein's coefficients – Population inversion – Types of lasers – He-Ne laser – Nd- YAG laser – Semiconductor laser – Industrial applications of laser – Medical applications of laser – Holography	**12**
II	Introduction – Propagation of light in optical fiber – Total internal reflection – Principle of optical fiber – Fractional Refractive index - Numerical aperture and acceptance angle – Types of optical fibers based on materials, modes of propagation and refractive index profile – Power losses in optical fibers – Fiber optic communication system – Fiber optic sensors – Temperature and Displacement – Fibre endoscope	**12**
III	Introduction – Classification of sound – Characteristics of musical sound – Pitch – Loudness – Quality – Intensity of sound – Weber Fechner Law – Reverberation – Reverberation Time – Sabine's Formula – Factors affecting the acoustics of a building – Absorption Coefficient – Measurement of Absorption coefficient	**12**

IV	Introduction – Production of ultrasonic waves – Magnetostriction Effect – Magnetostriction generator – Piezoelectric Effect – Properties of ultrasonics - Acoustic grating – Applications of ultrasonics – Industrial applications – SONAR – NDT –– Medical Applications	**12**
V	Types of electronic materials: metals, semiconductors, and insulators, Dia, Para, Ferro magnetic materials properties, Temperature effects - Hysteresis curve, Hard and soft magnetic engineering materials - Applications: Magnetic recording and reading – Hard disc. Superconductors: Properties of superconducting materials - Type I and Type II super conductors- Applications: Maglev.	**12**

COURSE OUTCOMES

CO1: Understand the concept of lasers and apply laser action in industries.

CO2: Explain and interpret the principle of fiber optics for different types of industrial sensors.

CO3: Discern the laws governing acoustics and implement the same in acoustic quieting.

CO4: Apply the fundamentals of ultrasonics in non-destructive testing.

CO5: Evaluate and perceive various laws governing magnetism with special reference to magnetic confinement for future power generation.

Text Books:

1. Engineering Physics, D.K. Bhattacharya and Poonam Tandon, New Delhi: Oxford University Press,2017.
2. Engineering Physics, S.Mani Naidu, New Delhi: Pearson India Education Services Pvt. Ltd., 2014.

Reference Books:

1. Engineering Physics, R.K. Gaur and S.L.Gupta, New Delhi: Dhanpat Rai Publications (P) Ltd.,2008.
2. Engineering Physics, Shatendra Sharma and Jyotsna Sharma, New Delhi: Pearson India EducationServices Pvt. Ltd., (2019)
3. Engineering Physics, Dattu R. Joshi, New Delhi: Tata McGraw Hill Education Private Ltd., (2010)
4. A Textbook of Engineering Physics, M. N. Avadhanulu and P. G. Kshirsagar, New Delhi: S.Chandand Company Ltd., (2009).

Mapping of Course Outcomes (COs) with PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	2	1	0	0	0	0	0	0	0	0	0	2	2	0	0
CO2	2	0	0	3	0	0	0	0	0	0	0	0	1	0	0
CO3	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
CO4	2	1	0	0	0	0	0	0	0	0	0	0	2	0	0
CO5	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0

3 – high, 2 – Average, 1 - low , 0-null

Programme	**B.TECH CSE (AI& IoT)**	**Programme Code**	**BTAI**
Course Code	**BTAI1125**	**Number of Hours/Week**	**3**
Semester	**II**	**Max. Marks**	**100**
Year	**I**	**Credits**	**3**

Course

Course Title	**DISCRETE STRUCTURES FOR COMPUTER SCIENCE**	**L**	**T**	**P**
		3	0	0

L-Lecture Hours T-Tutorial Hours P-Practical Hours

COURSE OBJECTIVES:

- To get familiar and understand the fundamental notions in discrete structures focusing on aspects of computer science
- To describe binary relations between two sets, combine relations using set operations and composition.
- To understand and demonstrate the basic concept of algorithm and its application in combinatorial mathematics.
- To identify the base step and the recursive or inductive step in applied problems and give a recursive and a non-recursive definition for an iterative algorithm.
- To classify the basic properties of graphs and trees and model simple applications.

UNIT	**TOPICS**	**HOURS**
I	**Set Theory and Logic** Sets – Functions – Relations - Equivalence Relation – Poset - Functions Logic: Propositional logic - Truth Tables – Tautologies - Resolution Proof System - Predicate Logic	8
II	**Induction and Combinatorics** Peano's Axioms - Mathematical Induction - Pigeon-Hole Principle - Principle of Inclusion and Exclusion - Review of Permutations and Combinations - Distribution Problems - Derangements - Bijection Principle.	8
III	**Algebraic Structures** Semi-Groups – Monoids – Groups - Subgroups and Their Properties - Cyclic Groups - Cosets - Permutation Groups - Lagrange's Theorem - Cayley's Theorem - Normal Subgroups - Homomorphism of Groups - Quotient Groups –Introduction to	9
IV	**Linear Algebra and Recurrence Relations** Linear Algebra: Vector Space – Basis, Dimension, Orthogonality - Recurrence Relations: Homogeneous and Inhomogeneous Recurrences and their Solutions - Solving Recurrences Using Generating Functions.	9

V	**Graph Theory** Definitions and Basic Results - Representation of a Graph by a Matrix and Adjacency List - Trees - Cycles - Properties - Paths and Connectedness - Subgraphs - Graph Isomorphism - Operations on Graphs - Vertex and Edge Cuts - Vertex and Edge Connectivity.	9

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1: Understand the fundamental aspects of discrete and continuous mathematical structures

CO2: Demonstrate the principles of mathematical induction to prove statements

CO3: Differentiate between various algebraic structures and analyze their properties.

CO4: Apply logical reasoning and mathematical techniques to solve problems in set theory, algebra andgraph theory.

CO5: Construct new mathematical models thereby generating solutions to complex recurrence relations andgraph problems.

Text Books

1. "Elements of Discrete Mathematics: A Computer Oriented Approach", C. L. Liu, D. P. Mohapatra,McGraw Hill, Third Edition, 2012.

2. "Applied Discrete Structures", Al Doerr, Ken Levasseur, LibreTexts, Third Edition, 2023

Reference Books

1. "Discrete Mathematical Structures with applications to Computer Science", Tremblay J.P. andManohar R., McGraw Hill International Edition, 1987.

2. "Discrete Mathematics and Its Applications", Kenneth H. Rosen, Sixth Edition, Tata McGrawHill, 2012.

Mapping of Course Outcomes (COs) with PSOs

	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
CO1	2	1	0	0	1	2	0	0	0	0	1	2	0	0	3
CO2	1	2	1	1	1	0	0	0	0	0	1	0	0	1	3
CO3	2	1	1	2	0	0	0	0	0	0	1	1	0	0	2
CO4	2	2	1	1	0	0	0	0	0	0	2	2	1	1	1
C05	3	2	1	2	3	0	0	0	0	0	1	1	0	2	2

3 – high, 2 – Average, 1 - low , 0-null

Programme	B.TECH CSE (AI& IoT)	Programme Code	BTAI
Course Code	AEEV1121	Number of Hours/ Week	2
Semester	II	Max. Marks	100
Year	I	Credits	2

Course

Course Title	ENVIRONMENTAL SCIENCE	L	T	P
		2	0	0

L-Lecture Hours T-Tutorial Hours P-Practical Hours

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students to:

- To understand the Environmental Foundations
- To differentiate between renewable and non-renewable resources and assess the impacts of land use changes, land degradation, and water resource exploitation.
- To study the causes and effects of pollution and its impacts on earth
- To analyse the population causes, its effects and control measures.

UNIT	TOPICS	HOURS
I	**Introduction to Environmental studies** Definition and Scope of Environmental Studies - Interdisciplinary Nature of Environmental Science-Historical Perspectives on Environmental Issues- Principles of Sustainability and Sustainable Development, Ecosystem- Structure and functions of ecosystem--Aquatic ecosystems	6
II	**Natural Resources- Renewable and Non-renewable Resources** Land resources and land use change, Land degradation, soil erosion, Desertification- Deforestation- exploitation of surface and ground water, floods, droughts, conflicts over water Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.	6
III	**Biodiversity and Conservation** Levels of biological diversity- genetic, species and ecosystem diversity, Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots.	6

IV	**Environmental Pollution** Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution - Nuclear hazards and human health risks-Solid waste management: Control measures of urban and industrial waste. Pollution case studies, Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture, Environment Laws: Environment Protection Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD), Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.	**12**

V	**Human Communities and the Environment** Human population growth: Impacts on environment, human health and welfare- Resettlement and rehabilitation of project affected persons, Disaster management: floods, earthquake, cyclones and landslides, Environmental movements- Chipko, Silent valley, Bishnoi's of Rajasthan.	**10**

Andragogy

Class Room Lectures, Power point presentation, You Tube, Group Discussion, Seminar, Quiz, Formative Assessments, Brain storming, Activity.

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1: Define environmental studies and its interdisciplinary nature

CO2: Analyze the structure and functions of various ecosystems, including aquatic ecosystems.

CO3: Evaluate the growing energy needs and the role of alternative energy sources

CO4:. Understand levels of biodiversity (genetic, species, and ecosystem) and identify

biodiversity hotspots, with a focus on conservation strategies.

CO5: Evaluate the effects of human population growth on the environment and the

importance of disaster management, resettlement, and environmental movements

Textbooks

1. Environmental and Sustainable Development, Keiji Ujikawa, MikioIshiwatari, Eric van Hullebusch, 1st Edition, springer publishers Singapore.
2. Environmental Science: Toward A Sustainable Future, Dorothy F. Bourse andRichard T. Wright, 13th edition,Pearson publishers.
3. Social Learning in Environmental Management: Towards a Sustainable Future,Meg Keen, Valerie A. Brown, Rob Dyball.
4. Principles of Environmental Science, William P. Cunningham and Mary AnnCunningham, 10th edition, Mc graw hill publishers.
5. Visualizing Environmental Science, Linda R. Berg, Mary Catherine Hager andDavid M. Hassenzahl.

Reference Books:

1. Waste Water Treatment, Rao, M.N., Datta, A.K.,Oxford and IBH Publishing Co. Pvt.Ltd, 1987.

2. Fundamentals of Ecology, Odum, E.P., Odum, H.T., and Andrews, J., , Saunders,Philadelphia, 1971, USA.

Mapping of Course Outcomes (COs) with PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
CO2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
CO3	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0
CO4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

3 – high, 2 – Average, 1 - low , 0-nul

Programme	**B.TECH CSE (AI & IoT)**	**Programme Code**	**BTAI**
Course Code	**BTAI1121 P**	**Number of Hours/Week**	**2**
Semester	**II**	**Max. Marks**	**100**
Year	**I**	**Credits**	**1**

Course

Course Title	**PYTHON PROGRAMMING LABORATORY**	**L**	**T**	**P**
		0	**0**	**2**

L-Lecture Hours T-Tutorial Hours P-Practical Hours

Course Objective:

The main learning objective of this course is to prepare the students for:

1. To learn fundamentals in python programming language
2. To introduce python modules for application
3. To familiarize python framework for machine learning applications
4. To develop machine learning application using python
5. To implement the research topics as per the python project list of experiments .

	List of experiments
1	Implement basic algebraic problems to get into python programming.
2	Implement string manipulations problems using python.
3	Implement problems using python datatypes such as tuple, list, dictionary etc.
4	Implement problems for python loops, conditional statements and functions
5	Implement object oriented programming concepts in python to solve different problems
6	Implement problems for python file manipulations
7	Implement standard machine learning algorithms using python frameworks such as TensorFlow, PyTorch etc.
8	Implement adavanced problems using python tools in a virtual environment as part of python project

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1 : Develop basic coding skills in python

CO2 : Understand python datatypes, modules, frameworks etc.

CO3 : Implement standard ML algorithms using python tools

CO4 : Apply python frameworks for ML applications

CO5 : Create ML model for existing problems

Mapping of CO's with PO's and PSO's (Articulation Matrix)

	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	1	3	0	0	1	0	1	0	1	0	2	0	0	2
CO_2	3	3	2	3	1	2	0	2	1	1	0	2	0	1	2
CO_3	3	2	3	2	3	1	1	0	0	1	0	2	2	2	3
CO_4	3	2	3	2	1	2	1	0	1	1	0	1	2	3	3
CO_5	2	2	3	3	3	0	1	3	1	1	1	1	3	3	3

3 – high, 2 – Average, 1 - low , 0-null

Programme	**B.TECH CSE (AI & IoT)**	**Programme Code**	**BTAI**
Course Code	**BTAI 1122 P**	**Number of Hours/Week**	**2**
Semester	**II**	**Max. Marks**	**100**
Year	**I**	**Credits**	**1**

Course Title	**Physics II LAB**	**L**	**T**	**P**
		0	**0**	**2**

L-Lecture Hours T-Tutorial Hours P-Practical Hours

1.

	List of experiments
1	Wavelength Determination – LASER diffraction
2	Particle size Determination – LASER diffraction
3	Attenuation of an Optical fibre– Fibre Optic Cable
4	Numerical Aperture measurement of an Optical Fibre– Fibre Optic Cable
5	Determination of Planck's constant – LED
6	Reverberation Time of a hall - Acoustics
7	Refractive index of a prism – Spectrometer
8	Wavelength of Mercury spectrum – Diffraction grating – Spectrometer

COURSE OUTCOMES

At the end of the courses, the student will be able to

1. Understand the concept of lasers and its action in industries.
2. Explain the principle of fiber optics for different types of industrial sensors.
3. Apply the basics of Lasers and Optical fibers.
4. Study the principles and applications of acoustics.
5. Discern the laws governing acoustics and its applications in acoustic

quieting.

6. Relate the application of light in optical devices.

Mapping of CO's with PO's and PSO's (Articulation Matrix)

	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
CO 1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	2
CO 2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
CO 3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
CO 4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
CO 5	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0

3 – high, 2 – Average, 1 - low , 0-null

———————————-" Second Semester Ends" ———————————