Introduction to Artificial Intelligence

RABBI ZIDNI 'ILMA

YENEPOYA

(DEEMED TO BE UNIVERSITY)

Ms. Chaithra Koppala (Course coordinator)

Department of Computer Science, YIASCM

Program Information:	
Program Name	BCA / BSc
Course / Subject Name	Introduction to Artificial Intelligence
Semester	III
Course Information:	
Course Code	BCA304 / BSC304
Course Title	Introduction to Artificial Intelligence
Credits	3
Total Contact Hours	45 + 15 notional hours
L-P-E	2:0:3
CA: UE Weightage	50:50
Pass Marks (CA and UE)	20
Aggregate Pass Marks	40
UE Question Paper Marks	75
Pre-requisite (if any)	40% CIA marks and 75% attendance

Course Objectives (CO)

CO1	Develop semantic-based and context-aware systems to acquire,organize, process, share and use the knowledge embedded in multimedia content.
CO2	Design problem solving techniques using AI and generating AI games.
CO3	Implement AI search algorithms in building AI model
CO4	Apply first order predicate calculus to represent and solve complex problems
CO5	Identify and analyse issues related to knowledge representation in AI
CO6	Interpret and summarize how different NLP techniques are applied to Natural Language data.

Introduction to Artificial Intelligence

Course Contents:

Module 1: Scope of AI (8 Hours)

Problem solving and Scope of AI Introduction to Artificial Intelligence. Applications Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction. Problem Solving State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm

Module 2: Knowledge Representation (7 Hours)

Knowledge Representation Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning

Module 3: Natural Language Processing (7 Hours)

Understanding Natural Languages Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation

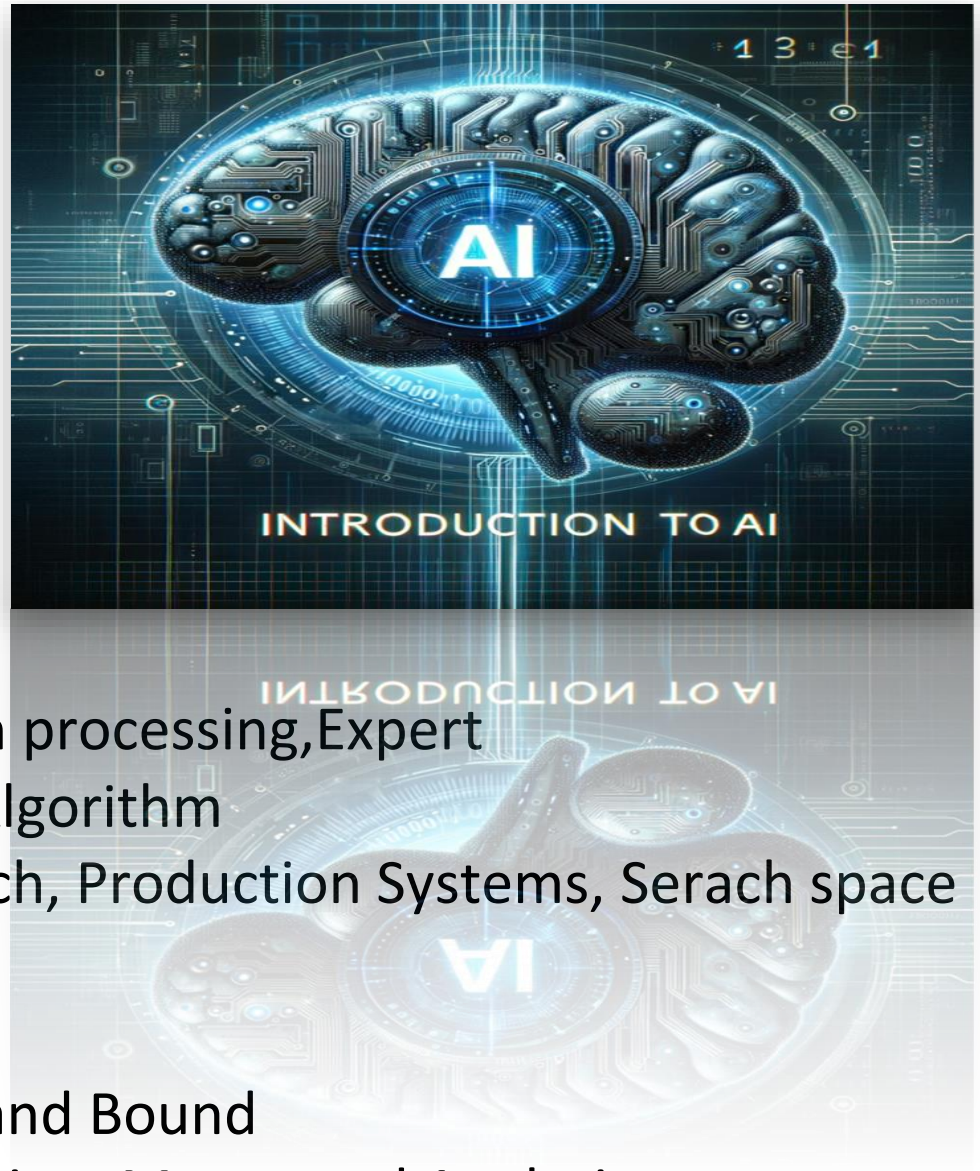
Module 4: Expert System (8 Hours)

Expert System: Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, R1 Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets

References:

- E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
- Nilsson, N. J. (1986). Principles of artificial intelligence. Morgan Kaufmann.
- Craig, J. J. (2009). Introduction to robotics: mechanics and control, 3/E. Pearson
- Education India.
- Klafter, R. D., Chmielewski, T. A., &Negin, M. (1989). Robotic engineering : an integrated approach. Prentice-Hall.
- Yoshikawa, T. (1990). Foundations of robotics: analysis and control. MIT press.

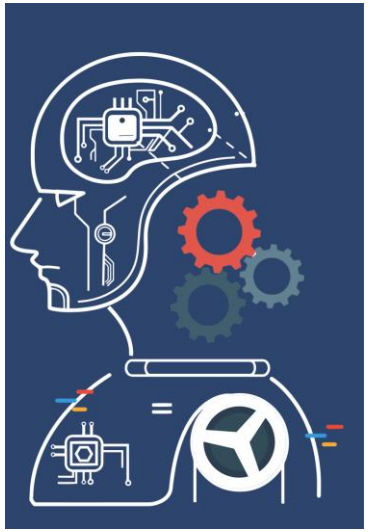
Module 01: Scope



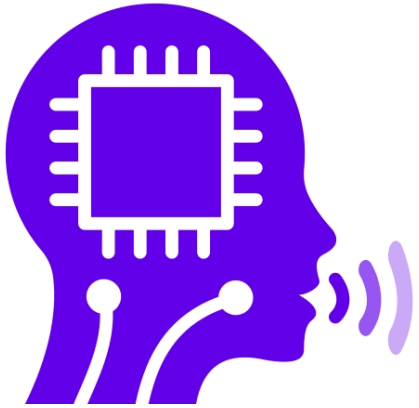
- Introduction to Artificial Intelligence:
  What is intelligence, what is AI
  Real life examples/Use cases
- AI applications:
  Games
- AI Techniques:
  ML,DL,NLP,Computer vision and speech processing,Expert systems,Rocotics,Fuzzy logics,Genetic Algorithm
- Problem Solving in AI: State Space Search, Production Systems, Serach space control
- Depth First Search, Breadth first search
- Heuristic Search: Hill Climbing, Branch and Bound
- Problem Reduction, Constraint Satisfaction, Means end Analysis
- A*, AO* algorithm

Module 02: Knowledge Representation

- Knowledge Representation Issues: Introduction to KR
- Types of Knowledge (Declarative, Procedural, Meta-knowledge)
- Issues in KR
- First order predicate calculus: prdicate logic, Quantifiers
- Horn Clauses: Syntax and examples, Conversion of predicate calculus to Horn Clauses
- Resolution: Principle and algorithm, examples and applications
- Semantic nets: Building, Representation of knowledge using semantic nets
- Frames: Components and usage, implementation
- Partitioned nets: structure and real world applications
- Procedural vs Declarative knowledge
- Forward vs Backward reasoning: Algorithms and examples, applications, case study and problem solving



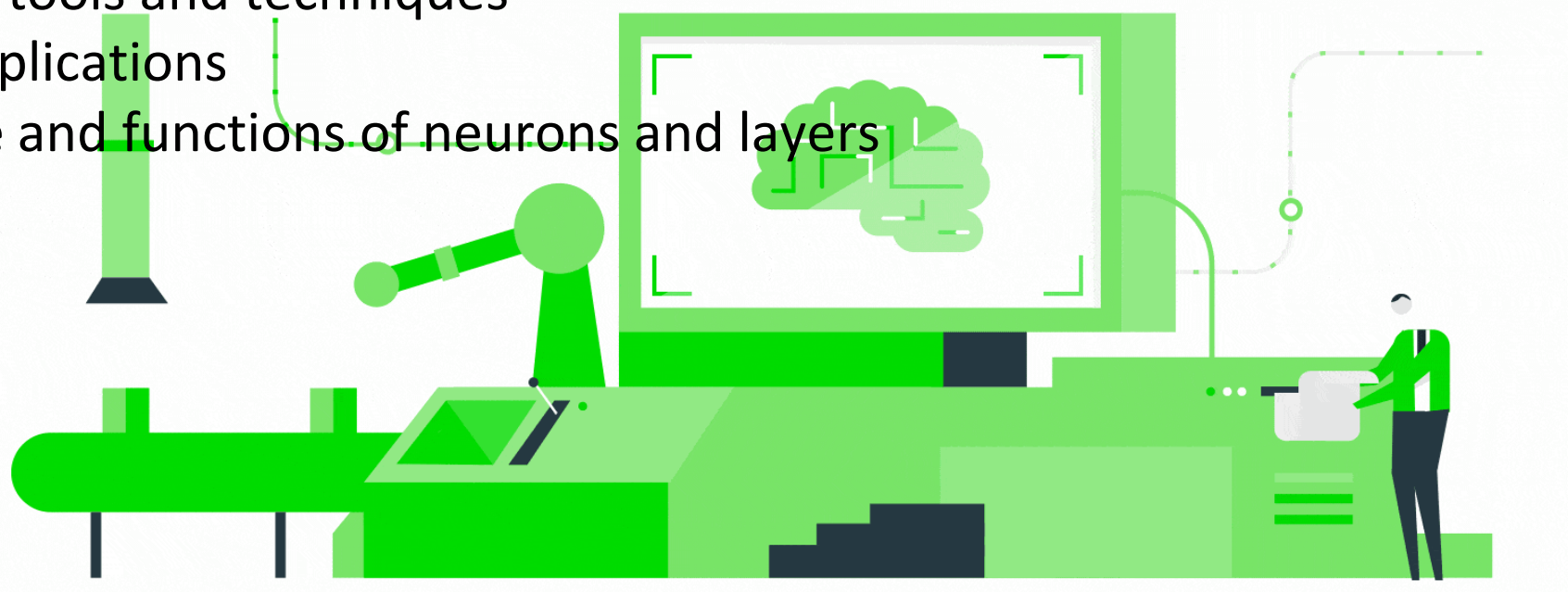
Module 03: NLP



- Understanding natural languages and introduction to NLP
- Importance and applications
- History and evolution
- Basic Syntactic Processing: syntax and role in NLP
- Analysis Techniques, syntax trees and parsing algorithms
- Basics of semantic analysis: Difference between syntax and semantics
- Parsing techniques: Top down and bottom up parsing
- Context free grammars and their role
- Grammar free analysers: use cases and limitations
- Sentence generation: Applications, techniques, template based and probabilistic methods
- Translation: Machine translation, challenges, techniques, rule based- statistical-neural translation

Module 04: Expert Systems

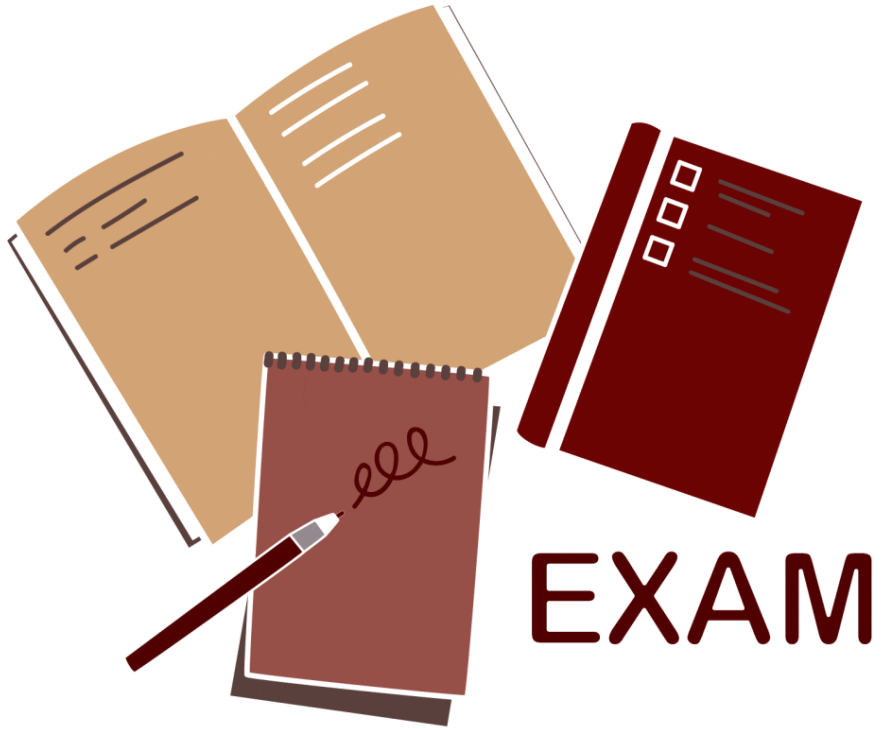
- Expert Systems:
  Need/importance, characteristics, real world applications
- Knowledge acquisition: techniques, role of knowledge engineers
- MYCIN and R1: analysis of its design and functionality, its impact and limitations
- Learning in AI: Types(Supervised, unsupervised, reinforcement)
- Learning automation: tools and techniques
- Genetic algorithm: applications
- Neural nets: structure and functions of neurons and layers



Why Study Artificial Intelligence?

- AI is a transformative technology that impacts nearly every aspect of modern life.
- AI is used in diverse fields like healthcare, finance, transportation, and entertainment, offering numerous career opportunities.
- Equips students with advanced problem-solving and critical thinking skills.
- drives innovation, enabling the creation of new products and solutions.
- growing demand for AI professionals in the job market.
- combines elements of computer science, mathematics, psychology, neuroscience, and more.
- Understanding AI involves grappling with its ethical implications and societal impact.

- To attend semester end examination, it is mandatory to have 75% attendance and 40% of the CIA marks.
- CIA is marked of 50 marks, based on the mentioned rubrics. 20 marks out of 50 is needed for SEE eligibility.
- SEE examination is out of 75 marks which will be converted to 50. So total marks is 100.
- There is no separate practical exams.



Assessment and Evaluation

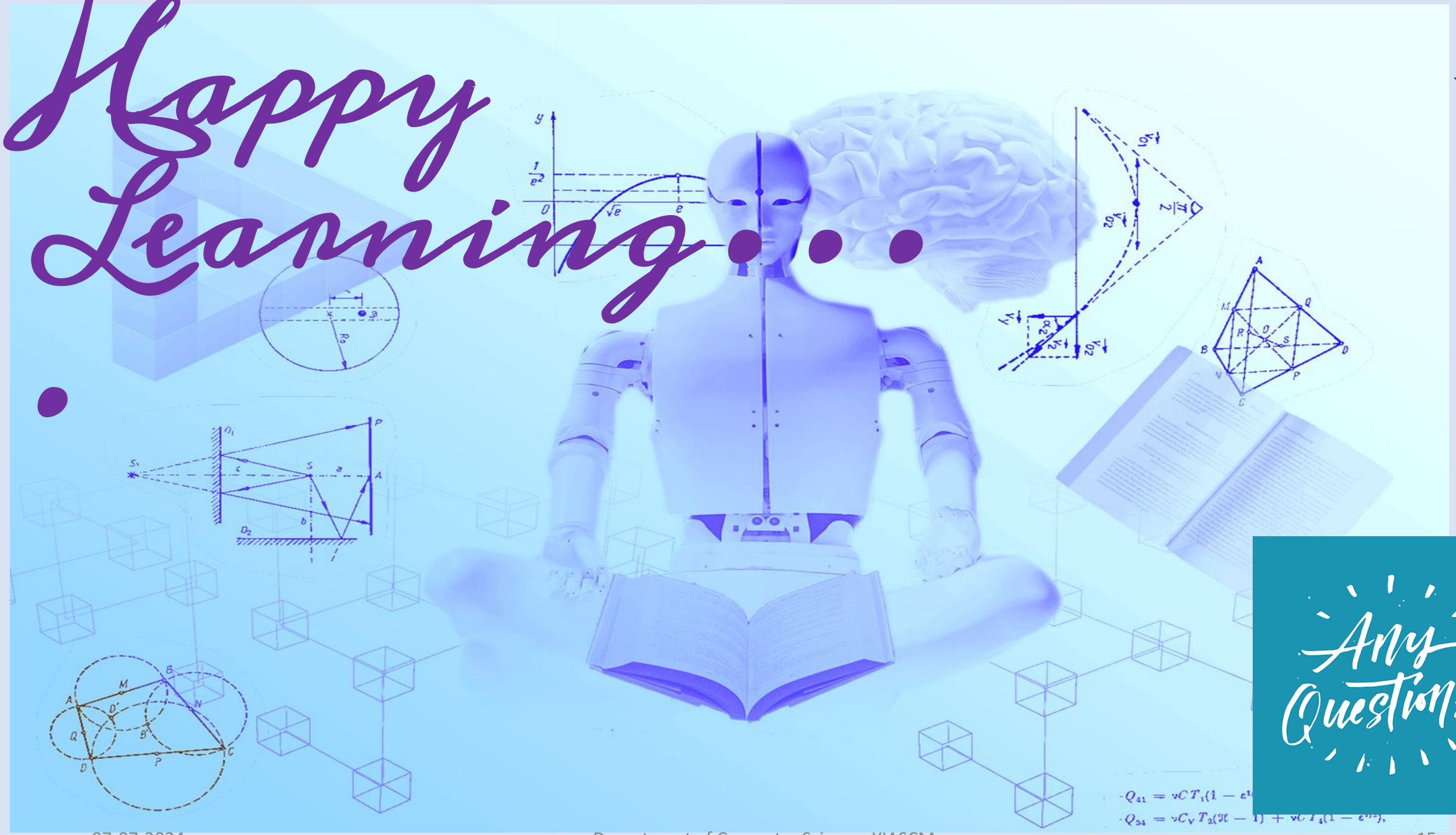
Sl. No.	Assessment Component	Formative / Summative (F/S)	Number	Marks for each	Total	Converted	
1	CIA 1: Internal test	**F**	2	30	60	20	**50**
2	CIA 2: Quiz		2	10	20	5	
3	CIA 3: Classroom assignment/activities *		14 + 1	5 + 10	80	10	
4	CIA 4: Class participation/class notes		4	10	40	5	
5	CIA 5: Writing Assignment and viva		2	10	20	10	
6	University Examination (UE/SEE)	**S**	1	75	75	50	**50**
	Total					**100**	**100**

CIA 3: Classroom assignment/activities *

Sl. No	Assignment/activity topic	Type	Individual/ Group(I/G)	Allotted marks
1	AI Applications	Group Discussion(GD)/ Problemathon/ Case study	G	5 m each and 10 m for Class test
2	Sentiment analysis	Problemathon/ GD	G	
3	BFS/DFS	Code Test/ Problemathon	I	
4	Hill Climbing Algorithm	Case Study	I	
5	A* and AO* algorithm	Research report	I	
6	Knowledge representation	Case Study/ Research report	I	
7	PL and quantifiers	Case study/ Problemathon	I	
8	Conversion	Research report	I	
9	Semantic net, Frame, Partitioned net	Case study/ Problemathon	I	
10	NLP	Research report	I	
11	Sentence analysis	GD	G	
12	Parsing techniques	Problemathon	I/G	
13	Expert system	Research report/ GD	G	
14	Automation tools	GD	G	
15	Class test	Open book test	I	

General Classroom Instructions

Happy Learning...



Any Questions?