**NB :** Additional 10 hours for Remedial and/or Tutorial classes

## CLASS – XI : SEMESTER – II

## SUBJECT: ARTIFICIAL INTELLIGENCE AND DATA SCIENCE ( AIDS)-THEORY

**FULL MARKS: 35** **CONTACT HOURS: 60 Hours**

| UNIT NO. | SUB UNIT | TOPICS | CONTACT HOURS | MARKS |
|---|---|---|---|---|
| **Unit -4 Statistics and Probability (6)** | **4** | Basic statistics - measures of dispersion, range, quartile deviation, mean deviation-for simple series and for frequency distribution, standard deviation- for simple series and for frequency distribution, variance, Standard deviation of composite group, median and mode, Pearson Correlation Coefficient, distance functions- Euclidean distance.<br>Probability theory- random experiment, event, mutually exclusive event, impossible and certain event, complementary event, equally likely events, sample space- discrete and continuous, mathematical definition of probability, probability distribution, combining events- Event complement and union, Joint probabilities and the law of total probability, Conditional probabilities, Conditional and joint probability tables, independence, and Bayes' Rule. Random variables and discrete distributions- The geometric distribution, The Bernoulli distribution, The binomial distribution, Continuous random variables- probability density functions, normal or Gaussian distribution | **12** | **6** |
| **Unit -5 Introduction to AI & DS (6)** | **5A** | Definitions of AI, Four main approaches to AI (Acting Humanly, Thinking Humanly, Acting Rationally, Thinking Rationally), History of AI, various real world applications of AI. Relation among AI, Machine Learning and Deep Learning. | **5** | **3** |

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| | **5B** | Definition of data science. Difference between Data Science and Artificial Intelligence. Data Science life cycle. Difference between quantitative and qualitative data. | **5** | **3** |
| **Unit -6 Intelligent Agent (5)** | **6** | **Intelligent Agents**- definition of an agent, definition of intelligent agent, A block diagram depicting agent's interaction with the environment through sensors and actuators, agent terminology-Performance measure, Behavior/action of an agent, Percept, Percept sequence, Agent function (Illustrating these terms using vacuum cleaner agent example), examples of some AI agents (robots, software agent(softbot), Autonomous spacecraft, Internet book shopping agent, etc.), rational agent, autonomous agent, Agent's environment, Structure of an AI Agent(Architecture + Agent programs), types of agents (block diagram and short description only) - simple reflex agent, model based reflex agent(state based), goal based agent, utility based agent, learning agent. | **10** | **5** |

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| **Unit -7 Solving Problem by Searching (12)** | **7** | **State Space Search**<br>Why search is important to an intelligent agent, modeling the search as state space search for a goal-based agent, State space search-what is an state, atomic representation vs factored representation of states, Formal representation of state space, Formulating search problem as state space search, formulating 8-puzzle problem and tic-tac-toe as state space search problems.<br>**Uninformed search**<br>a) Breadth first search b) Depth first search<br>**Informed search**<br>a) Heuristic search strategy with tic tac toe example b) Greedy best-first search c) A* search - basic idea only**( without proof)**<br>**Search in complex environments**<br>a) Local beam search b) Hill climbing (*only basic idea with a small example*) c) Simulated Annealing (*No algorithm, Only basic idea*)<br>d) Evolutionary algorithms and search(*basic idea with a small example*)- Purpose of evolutionary algorithms, an example of applying an evolutionary algorithm to a simple search problem and illustrating the terminology such as Initial Population, Fitness Function, Selection, Crossover, Mutation. | **18** | **12** |

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| **Unit -8 Knowledge Representation and Propositional Logic (8)** | | The main components of a Knowledge-based agent(basic idea only, no technical details): Knowledge base, Steps performed by a Knowledge-based agent to take an action, Difference between problem solving agent and Knowledge-based agent. knowledge presentation language- Logic-based Representation.<br>**Propositional logic**<br>propositional logic, logic as expressions, truth table, conjunction, disjunction, syllogism, tautology, De Morgan's theorem. Use of logic to derive conclusions with practical examples, Statements as logical propositions, Atomic and compound propositions, Negation, conjunction and disjunction as NOT, AND and OR, Implication and Biconditional statements, Truth table as a way of proving propositions, Commutativity and Associativity and Distributive rules, De Morgan's theorem, Practical examples to infer meanings from statements. Basic concept of Inference (With Simple examples), Answer Extraction system (With Simple examples) | **10** | **6** |

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