



Resolutions of the Board of Studies

Meeting held on: 22.01.2021, Time: 10 A.M at Adikavi Nannaya University, RJY

Agenda: B.Sc(Artificial Intelligence & Robotics) syllabus finalization .

Minutes of the UG-Board of Studies meeting for B.Sc(Artificial Intelligence & Robotics) held on 22/01/2021 at 10:00 A.M at Adikavi Nannaya University Convention Centre, Rajamahendravaram.

Members:

Dr. V.Persis	Chairman, Dept. of CSE, ANUR.
D.P.Venkateswara Rao	Member, Dept. of CSE, ANUR.
Mr. VSN Kumar	Member, Dept. of Computer Science Aditya Degree College, Kakinada
Mr.T.Ashok	Coordinator, Dept. of CSE, ANUR

Resolutions:

- 1.The following Computer Science Subjects will be part of the curriculum. Syllabus and Model question papers are prepared and submitted for the below 5 papers
- 2.Paper Setters and Evaluators lists are submitted

Semester-I:

Paper1:Web Technologies
Web Technologies Lab

Semester-II:

PaperII:Artificial Intelligence
AI Using PROLOG Lab

Semester-III:

PaperIII:Expert Systems
Expert Systems Using LISP Lab

Semester-IV:

Paper IV:Fundamentals of IoT and Robotics
IoT and Robotics Lab
Paper V :Machine Learning
ML using Python Lab

Members Present:

- 1.Dr.V.Persis , Dept.of CSE,ANUR
- 2.Dr.P.Venkateswara Rao, Dept.of CSE,ANUR
- 3.Mr.V.S.N Kumar, Dept.of CS,Aditya Degree College, Kakinada
- 4.Mr.T.Ashok, Dept.of CSE,ANUR



DETAILS OF PAPER TITLES & CREDITS

Se m	Course no.	Course Name	Cours e type (T/L/ P)	Hrs/Week (Arts/ Commerce:5 and Science: 4+2)	Credits (Arts/ Commerce:4 and Science:4+1)	Max. Marks Cont/ Internal/Mi d Assessment	Max. Marks Sem- end Exam
I	1	WebTechnologies	T	4	4	25	75
		WebTechnologies Lab	L	2	1	-	50
II	2	Artificial Intelligence	T	4	4	25	75
		AI using PROLOG Lab	L	2	1	-	50
III	3	Expert Systems	T	4	4	25	75
		Expert Systems using LISP Lab	L	2	1	-	50
IV	4	Fundamentals of IoT and Robotics	T	4	4	25	75
		IoT and Robotics Lab	L	2	1	-	50
	5	Machine Learning	T	4	4	25	75
		ML using Python Lab	L	2	1	-	50

Note: *Course type code: T: Theory, L: Lab



Syllabus of Theory and Lab for Artificial Intelligence & Robotics



BSc	Artificial Intelligence&Robotics (Semester: I)	Credits: 3
Paper: I	Web Technologies	Hrs/Wk: 4

COURSE OBJECTIVES:

This subject enables the student to create flexible, attractive, user-friendly web sites comprised of both static and dynamic web pages.. Along with that students will also learn about interactions with web pages through Javascript and host own web site on internet.

LEARNING OUTCOMES:

After Studying this subject students would have capability to make their own web site and host on internet. Also students would have enough knowledge about the technologies used in internet.

UNIT – I

HTML: Basic HTML Tags and Attributes, Document body, Text, Hyper links, Adding more Formatting, Lists, Tables, Grouping, Images. More HTML: Multimedia Objects, Frames, Forms, Headers

UNIT – II

Cascading Style Sheets: Introduction, Syntax, Selectors, Background Cursors, Text Fonts, Lists, Tables, Box Model, Using Styles, Simple Examples, Creation of Own Styles, Properties And Values In Styles, Formatting Blocks of Information, Layers.

UNIT – III

Introduction to JavaScript: What is DHTML, JavaScript Basics, Variables, String Manipulations, Mathematical Functions, Statements, Operators, Arrays and Functions.

UNIT – IV

DHTML with JavaScript: Data Validation, Opening A New Window, Messages and Confirmations, Status Bar, Different Frames, Rollover Buttons, Moving Images.

UNIT – V

XML: Defining Data for Web Applications, Basic XML, Document Type Definition, Presenting XML, Document Object Model, Web Services

TEXT BOOKS:

- 1.Harvey M. Deitel and Paul J. Deitel, “Internet & World Wide Web How to Program”, 4/e, Pearson Education.
- 2.Uttam Kumar Roy,WebTechnologies from Oxford University Press Student Activities



Co-curricular Activities:

- We for Web – Students with right mix of skills are formed as groups to develop websites.
- Web Ninja- A platform to showcase creative websites developed by students to their peers.

Assessment Methods:

- Formal Examinations
- Lab Practical Examination
- Presentations
- Simple Project



BSc	Artificial Intelligence Robotics (Semester: I)	Credits: 1
Paper: I	Web Technologies Lab	Hrs/Wk: 2

1. Design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags.
2. Create your class timetable using table tag.
3. Create a feedback form for your curriculum. Use textbox, text area, checkbox, radio button etc
4. Create a web page using frame. Divide the page into two parts with Navigation links on left hand side of page (width=20%) and content page on right hand side of page (width = 80%). On clicking the navigation Links corresponding content must be shown on the right hand side.
5. Write html code to develop a webpage having two frames that divide the webpage into two equal rows and then divide the row into equal columns fill each frame with a different background colour.
6. Create your resume using HTML tags. Experiment with colours, text, link, size and also other tags you studied.
7. Design a web page of your College Day Celebrations with an attractive background colour, text colour, images, font etc. Use CSS.
8. Use Inline CSS to format your resume that you created.
9. Use External CSS to format your class timetable as you created.
10. Use External, Internal, and Inline CSS to format web page of your start up. .
11. Develop a JavaScript to display your admission details in the college.
12. Develop simple calculator for addition, subtraction, multiplication and division operation using JavaScript.
13. Create HTML page with JavaScript which takes integer number as input and tells whether the number is odd or even.
14. Create HTML page that contains form for registration of your participation in a hackathon. Use relevant fields for input data. Write a JavaScript code to combine and display the input information when the button is clicked.
15. Create a login form with id and password. Perform input validation.



BSc	Artificial Intelligence & Robotics (Semester: II)	Credits: 3
Paper: II	Artificial Intelligence	Hrs/Wk: 4

COURSE OBJECTIVES:

The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning.

LEARNING OUTCOMES:

Students will acquire a fundamental understanding of the principles of artificial intelligence and its foundations and apply those basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning.

UNIT - I

Introduction to Artificial Intelligence : Introduction, Brief History, Intelligent Systems, Categorization of Intelligent Systems, Components of AI Program, Foundations of AI, Sub-areas of AI, Applications, Development of AI Languages, Current Trends in AI, Future of AI

UNIT – II

Intelligent Agents: Rational Agents, Mapping from Sequences to Actions, Properties of Environments, Structure of Intelligent Agents, Types of Agents: Simple Reflex Agents, Goal Based Agents, Utility Based Agents.

UNIT-III

Prolog Programming language: Introduction, Prolog Program, Control Strategy of Prolog, Programming Techniques in Prolog, List Manipulation in Prolog, System Predicate, Cut, Effect of Rule and Goal Orders, Structuring of Data in Prolog, Recursive Data Types in Prolog, System-Defined Predicates.

UNIT-IV

Uninformed Search Strategies: Breadth-First Search, Uniform Cost Search, Depth-First Search, Analysis of Search Methods

UNIT - V

Informed Search Strategies: Heuristic Functions, Best-First Search, Greedy Search, A* Algorithm, Optimal Solution by A* Algorithm.



TEXT BOOKS:

1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI, Pearson Education.
2. Artificial Intelligence – Structures and Strategies for Complex Problem Solving , George F Luger, Addison Wesley, Fifth Edition
3. Prolog Programming for Artificial Intelligence. Ivan Bratka- Third Edition – Pearson Education.
4. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.

Co-curricular Activities:

- AI News Board where students can stick upto date innovations happening in the field of AI.
- AiTube channel where students can publish their accomplishments in the field of AI.

Assessment Methods:

- Formal Examinations
- Lab Practical Examination
- Presentations
- Simple Project



BSc	Artificial Intelligence & Robotics (Semester: II)	Credits: 1
Paper: 2	AI Using PROLOG Lab	Hrs/Wk: 2

Students should practice a minimum of 10 programs from the list using Prolog

1. Program to add two numbers.
2. Program to categorize animal characteristics.
3. Program to read address of a person using compound variable.
4. Program to show concept of cut operator.
5. Program to count number of elements in a list .
6. Program to reverse the list.
7. Program to append an integer into the list.
8. Program to replace an integer from the list.
9. Program to delete an integer from the list.
10. Program to show concept of list.
11. Program to demonstrate family relationship.
12. Program to show how Prolog is used in medical diagnosis. .



BSc	Artificial Intelligence&Robotics (Semester: III)	Credits: 3
Paper: 3	Expert Systems	Hrs/Wk: 4

LEARNING OBJECTIVES:

Students will be able to explain and describe the concepts central to the creation of knowledge bases and expert systems. Students will be knowledgeable about the tools and the processes used for the creation of an expert system. Student will know methods used to evaluate the performance of an expert system.

LEARNING OUTCOMES:

At the end students will be able to get an understanding of how to transform human knowledge into an expert system and design a knowledge base. A basic understanding of natural language processing and pattern recognition is acquired.

UNIT – I

Introduction: Introduction to Expert System, Definitions, Importance of Expert System, Characteristic features of Expert System, Applications of Expert System, Different Categories of Expert Systems

UNIT-II

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT – III

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems versus Traditional Systems, Rule Based Expert Systems, Blackboard Systems, Truth Maintenance Systems.

UNIT – IV

Introduction to Natural Language: Overview of Linguistics, Grammars and Languages, Basic Parsing Techniques, Semantic Analysis and Representation Structures, Natural Language Generation, Natural Language Systems

UNIT-V

Pattern Recognition: Introduction, The Recognition and Classification Process, Learning Classification Patterns, Recognizing and Understanding Speech.

TEXT BOOKS:

1. Expert System principles and Programming-Giarratano.Rilev.2003
2. Introduction to Expert Systems, V James P.Iginizo.Mc.Graw-Hill.inc
3. Natural Language Processing: A Paninian Perspective, Akshar Bharti, Vineet Chaitanya and Rajeev sangal.



Co-curricular Activities:

- Quiz Competitions
- Expert Lectures
- Seminars

Assessment Methods:

- Formal Examinations
- Lab Practical Examination
- Presentations
- Simple Project



BSc	Artificial Intelligence & Robotics (Semester: III)	Credits: 1
Paper: 3	Expert Systems using LISP Lab	Hrs/Wk: 2

List of programs using LISP. A minimum of 10 programs should be executed.

1. Write a “Hello World” program in LISP
2. Write a LISP program to demonstrate the process of assigning the value in variable and showing them in console.
3. Write a LISP program to demonstrate the macros.
4. Write a LISP program to demonstrate the global and local variable and constant.
5. Write a LISP program to demonstrate the arithmetic expression.
6. Write a LISP program to demonstrate the comparison and logical operator.
7. Write a LISP program to demonstrate the decision making.
8. Write a LISP program to demonstrate the looping operations.
9. Write a LISP program to demonstrate the function.
10. Write a LISP program to calculate factorial by using function.
11. Write a LISP program to find maximum of three numbers.
12. Write a LISP program to find GCD of two numbers.
13. Write a lisp program to implement Fibonacci Series.
14. Write a program in LISP to demonstrate the concept of array.
15. Write a LISP program to demonstrate the string processing.



BSc	Artificial Intelligence&Robotics (Semester: IV)	Credits: 3
Paper: 4	Fundamentals of IoT and Robotics	Hrs/Wk: 4

COURSE OBJECTIVES:

The goal of the course is to familiarize the students with the fundamental concepts and techniques in robotic engineering and computer systems for their control and information processing.

LEARNING OUTCOMES:

Students will be exposed to fundamentals of IoT and a broad range of topics in robotics with emphasis on basics of manipulators, coordinate transformation and kinematics, trajectory planning and control techniques

UNIT- I

Introduction to IoT: Definition and Characteristics of IoT, IoT Enabling Technologies, IoT Levels and Deployment Templates. M2M and IoT, IoT Usecases: Home, Government, Cities, Environment, Energy Systems, Agriculture, Health and Lifestyle.

UNIT II

Introduction to Robotics: Classification, Components, Characteristics, Applications. Robotics Kinematics, Position Analysis, Robots as Mechanisms, Matrix Representation, Transformation Matrices, Forward and Inverse Kinematics.

UNIT III

Actuators: Characteristics of Actuating Systems, Actuating Devices and Control, Use of Reduction Gears, Comparison Of Hydraulic, Electric, Pneumatic Actuators, Hydraulic Actuators.

UNIT IV

Sensors: Sensor Characteristics, Description of Different Sensors, Vision Sensors, Force Sensors, Proximity Sensors, Tilt Sensors

UNIT V

Robot Controls: Point to Point Control, Continuous Path Control, Intelligent Robot, Control System for Robot Joint, Control Actions, Feedback Devices.

TEXT BOOKS:

1. Saeed B. Niku, Introduction to Robotics Analysis, Application, Pearson Education Asia, 2001.
2. Vijay Madiseti and Arshdeep Bahga, Internet of Things - A Hands-on Approach, First Edition, University Press, 2015



Co-curricular Activities:

- Take up IoT Projects of societal relevance
- Adopt a school from rural area and educate children in simple IoT projects

Assessment Methods:

- Formal Examinations
- Lab Practical Examination
- Presentations
- Simple Project



BSc	Artificial Intelligence & Robotics (Semester: IV)	Credits: 1
Paper: 4	IoT and Robotics Lab	Hrs/Wk: 2

IoT LAB EXPERIMENTS. A minimum of 4 experiments should be done.

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed
6. Students are encouraged to explore the surrounding problems and design Solutions based on IoT for any 3 of the following.
 - i. Health Monitoring System
 - ii. Smart Irrigation System using Cloud
 - iii. Smart Waste Management System
 - iv. Smart Street Lights System
 - v. Fire and Smoke Detection System
 - vi. Gas Leakage Detection System
 - vii. Water level Monitoring and Controlling System in Tanks
 - viii. Air and Sound Pollution Monitoring System
 - ix. Intruder (Human/Animal) Detection in Agriculture Field
 - x. Girl Child Safety System using GPS and GSM

ROBOTICS LAB EXPERIMENTS. A minimum of 3 experiments should be done.

1. Programming a simple Robot on Wheels.
2. Programming a Walking Robot.
3. Experiments based on Bipedal Robot.
4. Experiments based on Humanoid Robot
5. Spy Robot using RF Communication System
6. Study of robotic arm and its configuration
7. Study the robotic end effectors
8. Study of sensor integration.
9. Setting robot for any one industrial application after industrial visit



BSc	Artificial Intelligence&Robotics (Semester: IV)	Credits: 3
Paper: 5	Machine Learning	Hrs/Wk: 4

COURSE OBJECTIVES:

To introduce students to the basic concepts and techniques of Machine Learning. To develop skills of using recent machine learning software for solving practical problems. To gain experience of doing independent study and research.

LEARNING OUTCOMES:

On completion of the course students will be expected to have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc. And also gain an understanding of the strengths and weaknesses of many popular machine learning approaches.

UNIT-I

Introduction: Well Posed Learning Problems, Choices in Designing a Learning System – Choosing the Training Experience, Choosing the Target Function, Choosing the Representation for Target Function, Choosing a Function Approximation Algorithm, The Final Design

UNIT-II

Concept Learning: Introduction, Concept Learning Task- Notation, Concept Learning Search, FIND-S, The-List-Then Algorithm, Candidate Elimination Algorithm with an Illustrative Example, Inductive Bias

UNIT-III

Decision Tree Learning: Decision Tree Representation, Appropriate Problems for Decision Tree Learning, Basic Decision tree Learning Algorithm with an Illustrative Example, Issues in Decision Tree Learning

UNIT-IV

Neural Network Learning: Neural Network Representations, Problems for Neural Network Learning, Multi Layer Network and Back propagation Algorithm, Illustrative Example of Back Propagation Algorithm

UNIT-V

Instance Based Learning: K Nearest Neighbour Learning Algorithm, Locally Weighted Regression, Case-Based Reasoning.

TEXT BOOKS:

1. Machine Learning, Tom Mitchell , McGraw Hill, 1997
2. Practical Machine Learning with Python, Dipanjan Sarkar, Raghav Bali, Tushar Sharma, A Press, 2018.



Co-curricular Activities:

- Special Interest Group in Machine Learning
- Machine Learning News Club

Assessment Methods:

- Formal Examinations
- Lab Practical Examination
- Presentations
- Simple Project



BSc	Artificial Intelligence & Robotics (Semester: IV)	Credits: 1
Paper: 5	ML using Python Lab	Hrs/Wk: 2

Implement a minimum of 2 programs using each of the following Python Libraries that are popularly used in Machine Learning.

1. Numpy for basic mathematical operations
2. Scipy for image manipulation
3. Scikit-learn for decision tree classifier
4. Theano for computing logistic functions
5. Keras to build neural networks
6. Tensorflow for deep learning functions
7. Pytorch for computer vision and NLP
8. Pandas for data analysis
9. Matplotlib for data visualisation
10. Opencv for face recognition and identifying objects



Model Question Papers for Artificial Intelligence & Robotics



BSc	Artificial Intelligence &Robotics(Semester: I)	Max. Marks: 75M
Paper: 1	Web Technologies	Time:3Hrs

MODEL QUESTION PAPER
Semester:I
Paper:I Web Technologies

Time: 3 hours

Max Marks: 75

SECTION – A

Answer any 5 questions. Each question carries 5 marks (5 X 5M = 25M)

1. Explain the features of a HTML page
2. How javascript is useful to validate your data in a webpage? Explain
3. What is javascript
4. What is DHTML
5. Explain steps to create own styles
6. How to open a new window
7. Explain formatting tags in HTML
8. Explain Web Services

SECTION – B

Answer all the questions. Each question carries 10 marks (5 X 10M = 50M)

9. What is table? Explain how to create them and their attributes in HTML
(OR)
10. Why forms are useful in HTML.How to create them in HTML.Explain
11. What is CSS? Write different types of CSS
(OR)
12. Explain about layers in CSS in detail with an example program
13. Explain different Built-in object in Javascript
(OR)
14. What are the operators in javascript
15. Write exception handling in javascript
(OR)
16. Write regular expressions in java script
17. Why XML? Explain XML elements
(OR)
18. Explain with an example XML Schema



BSc	Artificial Intelligence & Robotics (Semester: II)	Max. Marks: 75M
Paper: 2	Artificial Intelligence	Time: 3Hrs

MODEL QUESTION PAPER
Semester: II
Paper: II **Artificial Intelligence**

Time: 3 hours

Max Marks: 75

SECTION – A

Answer any 5 questions. Each question carries 5 marks (5 X 5M = 25M)

1. Explain the applications of AI
2. Explain characteristics of intelligent agent.
3. What is recursive data types in prolog
4. What is a uniform cost search algorithm
5. Explain Greedy Search
6. What is Informed search Algorithm
7. What are the components of AI
8. What is Rational agents

SECTION – B

Answer all the questions. Each question carries 10 marks (5 X 10M = 50M)

9. Explain the characteristics of an AI technique
(OR)
10. Explain different categories of Intelligence Systems
11. Explain structure of Intelligent agents
(OR)
12. Explain list manipulations in prolog
13. Explain System defined predicates
(OR)
14. Explain Breath first search
15. Explain Analysis of search methods
(OR)
16. Explain Heuristic Functions
17. Explain A* Algorithm
(OR)
18. Explain with an example XML Schema



BSc	Artificial Intelligence &Robotics(Semester: III)	Max. Marks: 75M
Paper: 3	Expert Systems	Time:3Hrs

MODEL QUESTION PAPER
Semester:III
Paper:III **Expert Systems**

Time: 3 hours

Max Marks: 75

SECTION – A

Answer any 5 questions. Each question carries 5 marks (5 X 5M = 25M)

1. What are the main components of a rule-based system
2. Explain Knowledge acquisition
3. What is Extended Semantic Network
4. Explain parsing Technique
5. Explain steps to create own style
6. Explain Approaches to Knowledge Representation
7. What is Logical Representation
8. Explain knowledge base agent

SECTION – B

Answer all the questions. Each question carries 10 marks (5 X 10M = 50M)

9. What are the applications of Expert Systems
(OR)
10. Explain different categories of Expert systems
11. Explain Approaches to Knowledge Representation
(OR)
12. Explain Frame Representation
13. Explain Phases in Building Expert System
(OR)
14. Explain truth maintenance system
15. Explain Elements of Semantic Analysis
(OR)
16. Explain natural language generation
17. Explain Pattern Recognition
(OR)
18. Explain Learning Classification Pattern



BSc	Artificial Intelligence&Robotics(Semester: IV)	Max. Marks:75M
Paper: 4	Fundamentals of IoTand Robotics	Time:3Hrs

MODEL QUESTION PAPER

Semester: IV

Paper:IV **FUNDAMETALS OF IoT AND ROBOTICS**

Time: 3 hours

Max Marks: 75

SECTION – A

Answer any 5 questions. Each question carries 5 marks (5 X 5M = 25M)

1. Explain the role of IoT in agriculture
2. Explain IoT enabling technologies
3. How are matrices used in Robotics
4. What are the characteristics of Robotics
5. What is Hydraulic Actuators
6. What is Actuators
7. Explain force sensors
8. Explain point to point control

SECTION – B

Answer all the questions. Each question carries 10 marks (5 X 10M = 50M)

9. Explain different characteristics of IoT
(OR)
10. Explain difference between M2M and IoT
11. Explain the applications of Robotics
(OR)
12. Explain Forward and Inverse Kinematics
13. Explain Characteristics of Actuating Systems
(OR)
14. Explain the Use of Reduction Gears
15. Explain the characteristics of Sensors
(OR)
16. Explain different types of Sensors
17. Explain Intelligent Robots
(OR)
18. Explain control system for Robot Joint



BSc	Artificial Intelligence&Robotics(Semester: IV)	Max. Marks:75M
Paper: 5	Machine Learning	Time:3Hrs

MODEL QUESTION PAPER

Semester:IV

Paper:V **Machine Learning**

Time: 3 hours

Max Marks: 75

SECTION – A

Answer any 5 questions. Each question carries 5 marks (5 X 5M = 25M)

1. What is Decision Tree
2. Explain well-posed learning problems
3. What is function approximation in machine learning
4. What is machine learning explain types of machine learning
5. How decision tree is used for classification
6. Explain the concept of Neural Network
7. Explain multilayer network
8. Explain case based reasoning

SECTION – B

Answer all the questions. Each question carries 10 marks (5 X 10M = 50M)

9. Explain the steps involved in designing a Learning System
(OR)
10. What is the target function in machine learning
11. What is concept learning explain with example
(OR)
12. Explain candidate elimination algorithm?
13. Explain Decision Tree classification Algorithm
(OR)
14. What are different issues in decision tree learning
15. Explain Neural Network Representation
(OR)
16. What is back propagation algorithm in neural network
17. What is the use of K nearest neighbors algorithm explain
(OR)
18. Explain instance based learning