



Karmaveer Bhaurao Patil University, Satara

Syllabi for

B.Sc. II (Artificial Intelligence)

Under

Faculty of Science and Technology

(As per NEP 2020)

With effect from Academic Year 2025-2026

Syllabi for Bachelor of Science (B.Sc.) Part-II Artificial Intelligence

PREAMBLE:

This syllabus is framed to give knowledge with an understanding of Artificial Intelligence to undergraduate students in the B.Sc. degree programme.

The Bachelor of Science (B.Sc.-II) in Artificial Intelligence course is designed to provide students with a strong foundation in the principles, theories and applications of Artificial Intelligence enabling them to meet in the intelligent digital era. Aligned with the National Education Policy (NEP) 2020, the program emphasizes multidisciplinary learning, skill development, critical thinking, innovation and experiential education.

The curriculum integrates fundamental concepts of Artificial Intelligence with emerging intelligent technologies, preparing students to analyse complex problems, design intelligent solutions and develop AI-based systems using modern tools, programming languages and machine learning frameworks. It encompasses core areas such as programming, mathematics for AI, data structures and algorithms, machine learning, deep learning, natural language processing, computer vision, data science, cloud computing, AI ethics, software engineering along with practical laboratory work, internships, projects, research-oriented learning.

GENERAL OBJECTIVES OF THE PROGRAMME:

1. To provide students with a strong foundation in the core principles and theories of Artificial Intelligence and machine learning.
2. To foster a scientific and analytical mindset, encouraging curiosity, critical thinking, innovation in solving complex problems.
3. To develop practical skills in programming, algorithm design, data handling, implementation of AI models and systems.
4. To help students understand key AI concepts, terminologies, techniques, their interrelationships across different domains.
5. To raise students awareness of ethical, social, environmental implications of artificial intelligence and its applications.
6. To equip students with interdisciplinary knowledge in computer science, mathematics, data science, cognitive science to enable a holistic understanding of intelligent systems.
7. To empower students to apply AI knowledge and tools to address real-world challenges in sectors like healthcare, education, agriculture, business, sustainability.

GENERAL OUTCOME OF THE PROGRAMME:

After completing the B.Sc. program, graduates will...

1. Understand the fundamental concepts of Artificial Intelligence, programming, algorithms, data handling, intelligent systems, apply them to solve real-world problems.
2. Pursue higher education, research, career opportunities in Artificial Intelligence, machine learning, data science, computer science related fields.
3. Secure employment in government organizations, public sector undertakings, software companies, IT industries, AI-based organizations and other technology sectors.
4. Demonstrate professional ethics, effective communication, teamwork, leadership, problem-solving skills required in academic and professional environments.
5. Adapt to emerging AI technologies through continuous learning and develop innovative, responsible,

sustainable AI-based solutions that contribute to society.

PROGRAMME SPECIFIC OBJECTIVES OF THE COURSE:

1. Develop a strong foundation in Artificial Intelligence, Machine Learning, Data Science, programming, and related computational sciences
2. Apply analytical thinking, critical reasoning, and problem-solving skills to design and develop AI-based solutions for real-world and interdisciplinary applications.
3. Acquire practical skills in programming, data analysis, algorithm development, and the implementation of AI models and intelligent systems.
4. Prepare for higher education, research, and advanced studies in Artificial Intelligence, Data Science, Robotics, and related fields in India and abroad.
5. Qualify for competitive examinations and technical roles in government organizations, public sector undertakings, and AI-driven industries.
6. Develop entrepreneurial skills to create AI-based products, services, and innovative technology solutions while meeting industry requirements.
7. Demonstrate professional ethics, effective communication, teamwork, leadership, and social responsibility in the development and deployment of Artificial Intelligence technologies.

PROGRAMME SPECIFIC OUTCOMES OF THE COURSE:

After completing the B.Sc. (Artificial Intelligence) program, students will:

1. Be able to explain, describe, discuss fundamental and advanced concepts in artificial intelligence, machine learning, data science.
2. Design, develop, implement AI models, algorithms, intelligent systems to solve real-world problems.
3. Critically analyze data, models, outcomes to improve decision-making and system performance.
4. Apply AI techniques to build innovative solutions across domains such as healthcare, agriculture, business, education, environmental sustainability.
5. Utilize their technical skills to become self-reliant, by securing employment in AI driven industries, starting their own tech-based ventures, or freelancing in the digital economy.
6. Design and manage AI-based projects with a focus on scalability, performance, ethical responsibility.
7. Gain industry-relevant skills and exposure through internships, workshops, live projects in collaboration with AI and tech companies.
8. Enhance research competencies through academic research, innovation challenges, capstone projects.
9. Critically assess the societal and ethical implications of AI applications and contribute responsibly to the development of sustainable and inclusive technologies.

1. **Title:** Artificial Intelligence

2. **Year of Implementation:** From 2025-2026

3. **Duration:** 01 year

4. **Pattern:** Semester examination

5. **Medium of Instruction:** English

6. STRUCTURE OF COURSE:

AS PER NEP-2020 (2.0)

Program Structure for B. Sc. II (Semester III & IV)

Sem (Level)	Courses					Total Credit
	Course I	Course II	OE	VSC/ SEC	AEC/ VEC/ IKS	
	Major	Minor				
Sem III (5.0)	Major V (2) Major VI (2) Major P III (2)	Minor V (2) Minor VI (2) Minor P III (2)	OE III (2)	VSC I (2) (P) (Major specific) SEC I (2) (P)	AEC I (2) (English) IKS II (2) (Major Specific)	22
Sem IV (5.0)	Major VII (2) Major VIII (2) Major P IV (2)	Minor VII (2) Minor VIII (2) Minor P IV (2)	OE IV (2)	VSC II (2) (P) (Major specific) SEC II (2) (P)	AEC II (2) (English) VEC II (2) (Environmental studies)	22

Abbreviations: DSC: Discipline Specific Course; OE: Open Elective; T: Theory, P: Practical; IKS: Indian Knowledge System; Discipline Specific Course, AEC: Ability Enhancement Course VSC: Vocational Skill Course; SEC: Skill Enhancement Course, VEC: Value Education Course, T: Theory, P: Practical,

7. COURSE TITLES

SEMESTER III

Sr.no	Course Category	Course Code	Name of Course	Credits
1	Major -V	BAIT 231	Web Programming with AI	02
2	Major-VI	BAIT 232	Advance Machine Learning	02
3	Major Practical – III	BAIP 233	Lab I (Based on BAIT 231 & Based on BAIT 232)	02
4	Minor-V	BAIP 234	AI for Electronics Application Development	02
5	Minor-VI	BAIT 235	RDBMS	02
6	Minor Practical-III	BAIP 236	Lab I (Based on BAIT 235 & BAIP 236)	02
7	OE	BAITOE III	OE-3	02
8	VSC	BAIPVSC I	FIGMA Techniques	02
9	SEC	BAIPSEC I	OpenCV for AI Solutions	02
10	AEC	BAITAEC I	English for Communication III	02
11	IKS	BAITIKS II	History of Artificial Intelligence in India	02

SEMESTER IV

Sr. No.	Course Category	Course Code	Name of Course	Credits
1	Major -V	BAIT 241	Algorithms in Artificial Intelligence	02
2	Major -VI	BAIT 242	Object Oriented Programming for AI	02
3	Major Practical –III	BAIP 243	Lab I (Based on BAIT 241& BAIT 242)	02
4	Minor-V	BAIP 244	AI Applications for Internet of things	02
5	Minor-VI	BAIT 245	AI-Enhanced Software Engineering	02
6	Minor Practical-III	BAIP 246	Lab II (Based on BAIT 244 & BAIP 245)	02
7	OE	BAITOE IV	OE-4	02
8	VSC	BAIPVSC II	Desktop publishing	02
9	SEC	BAIPSEC II	Data analytics using R programming	02
10	AEC	BAITAEC II	English for Communication IV	02
11	VEC	BAITVEC II	Environmental Studies	02

8. EVALUATION STRUCTURE 2025-26

B.SC. II NEP 2.0

SEMESTER III (5.0)

Course	Course Category	Course Code	Internal Evaluation	ESE	Total Marks	Credits
Major	T	BAIT 231	20	30	50	02
	T	BAIT 232	20	30	50	02
	P	BAIP 233	20	30	50	02
Minor	T	BAIT 234	20	30	50	02
	T	BAIT 235	20	30	50	02
	P	BAIP 236	20	30	50	02
OE	T	BAITOE 3	20	30	50	02
VSC	P	BAIPVS 1	20	30	50	02
SEC I	P	BAIPSEC 1	20	30	50	02
AEC I	T	BAITAEC 1	20	30	50	02
IKS II	T	BAITIKS 2	20	30	50	02
Total					550	22

SEMESTER IV (5.0)

Course	Course Category	Course Code	Internal Evaluation	ESE	Total Marks	Credits
Major	T	BAIT 241	20	30	50	02
	T	BAIT 242	20	30	50	02
	P	BAIP 243	20	30	50	02
Minor	T	BAIT 244	20	30	50	02
	T	BAIT 245	20	30	50	02
	P	BAIP 246	20	30	50	02
OE	T	BAIT OE 4	20	30	50	02
VSC	P	BAIP VSC 2	20	30	50	02
SEC	P	BAIPSEC 2	20	30	50	02
AEC II	T	BAITAEC 2	20	30	50	02
VEC II	T	BAITVEC 2	20	30	50	02
Total					550	22

INTERNAL EVALUATION STRUCTURE

- Internal evaluation of theory papers shall carry a weightage of 40%.
- Activity: For the internal evaluation of theory papers following activities will be adopted for CCE I & CCE II: class test/ open book test/ online course/ Industrial review/ Industrial visit/ e learning video creation/ assignment/ seminar/ case study/ field work/ project
- CCE III shall consist of multiple-choice questions.
- Each CCE will carry 10 marks for 2-credit theory papers and 20 marks for 4-credit theory papers, and the best two scores will be considered for final score.
- Internal evaluation of practical papers shall carry a weightage of 40%.
- For practical examinations, internal evaluation will be based on student performance, attendance, journal records, and viva voce

Abbreviation: CCE – Continues Comprehensive Examination ESE – End Semester Examination.

9. OTHER FEATURES:

A) LIBRARY:

The Institute and Departmental libraries are well-equipped with a wide range of reference books, textbooks, academic journals, periodicals related to Artificial Intelligence, Computer Science and Data Science.

B) EQUIPMENT:

i. DIGITAL INFRASTRUCTURE:

1. High-performance computers with AI-capable GPUs - 120
2. Interactive Panels - 4
3. High-speed internet

ii. LABORATORY EQUIPMENT & TOOLS:

1. AI & Data Science Workstations with pre-installed software (Python, Tensor Flow, etc.)
2. Raspberry Pi, Arduino kits, robotics kits for hands-on learning.
3. Virtual labs.
4. IOT development boards and sensors.

SEM - III



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(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - III

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Web Programming with AI(BAIT 231)

Course Objectives: Students Should be able to...

- 1) Learn the skills and project-based experience needed for entry into web application and development careers.
- 2) Learn the key technology components are descriptive languages, server-side program elements.
- 3) Learn client-side program elements.
- 4) Use specific contents that are beneficial for developing web-based solutions.

Course Outcomes: Students will be able to...

- 1) Analyze the history and basic concepts of artificial intelligence.
- 2) Understand the fundamentals of web development including HTML, CSS.
- 3) Recognize the intersection and potential synergies between web programming and AI.
- 4) Familiar with various tools and frameworks used for integrating AI into web applications.

Module	Title and Contents	Hrs
Module -1:	Introduction to Web Development and AI 1.1 Overview of Web Programming: Understanding the fundamentals of web development – including client-side and server-side scripting languages 1.2 Introduction to Artificial Intelligence (AI): Definition, scope and applications of AI in various fields 1.3 Intersection of Web Development and AI: Exploring how AI technologies enhance web applications and user experiences. 1.4 Tools and Technologies: Introduction to essential tools and technologies for web development and AI integration.	07
Module -2:	Frontend Development and AI Integration 2.1 What is HTML: History, HTML Documents – Basic structure – Creating an HTML document – Features and Limitations. 2.2 Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags, Formatting tags, Introduction to elements of HTML: Working with Text. Working with Lists, Tables and Frames Working with Hyperlinks – Images – Image format (quality, size, type) Importing images (scanners) – Working with Forms and controls. 2.3 Responsive Web Design: Techniques for creating web applications that adapt to different screen sizes and devices. 2.4 Introduction to AI Libraries and APIs: Overview of popular AI libraries and APIs for frontend integration.	08
Module -3:	Introduction to Cascading Style Sheets 3.1 Concept of CSS – Creating Style Sheet 3.2 CSS Properties : CSS Styling (Background, Text Format, Controlling	08

	Fonts) 3.3 Working with block elements and objects – Working with Lists 3.4 Tables - CSS Id and Class Box Model (Introduction, Border properties, Padding Properties, Margin properties) 3.5 CSS Advanced (Grouping, Dimension, Display, Positioning – Floating, Align, Pseudo class – Navigation Bar)	
Module -4:	Introduction to Web Publishing, Multimedia and Hosting 4.1 Creating the Web Site – Saving the site Working on the web site 4.2 Creating web site structure – Creating Titles for web pages Themes Publishing web sites – Inserting audio files – Video files and acceptable formats (MPEG, Quick Time – Video for Windows). 4.3 Inserting video files – Screen control attributes (width, height,align) Start control attributes (start, fileopen, loop, loopdelay, and mouseover) 4.4 Basic concepts of Images: Digital Images and Digital Image Representation – Image Formats: tiff, bmp, jpg/jpeg, gif, and pic.pdf, Hosting Basics – Types of Hosting.	07

Reference Books:-

1. Patel, Sandeep Kumar. *AI for Web Development: Leverage the Power of Machine Learning and Deep Learning to Build Smart Web Applications*. Birmingham, UK: Packt Publishing, 2019.
2. Pine, David. *Deep Learning for Web Developers: Leverage the Power of Deep Learning to Create and Deploy Neural Network-Driven Web Applications*. Birmingham, UK: Packt Publishing, 2018.
3. Watson, Mark. *Building Intelligent Web Applications: How to Get Started with Artificial Intelligence-Driven Web Applications*. Birmingham, UK: Packt Publishing, 2019.
4. Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. *Deep Learning*. Cambridge, MA: MIT Press, 2016.
5. Géron, Aurélien. *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems*. 3rd ed. Sebastopol, CA: O'Reilly Media, 2022.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20 Marks): • CCE-I 10 Marks : Activity • CCE-II 10 Marks : Activity • CCE-III 10 Marks : MCQ Test (Best of 2 from CCE I, II & III Selected for final Score)	End Semester Examination (30 Marks): • Question -1: Solve the following questions (5 questions of 2 Marks) • Question -2: Attempt Any two out of three questions (3 questions of 10 Marks) • Question -3: Attempt Any Four out of Six questions (6 questions of 5 Marks) (50 Marks converted to 30 marks)
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Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester – III

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Advance Machine Learning(BAIT 232)

Course Objectives: Students Should be able to...

- 1) Understand advance concepts of machine learning and its various algorithms.
- 2) Understand various strategies of generating models from data and evaluating them.
- 3) Learn how to handle challenges such as interpretability, scalability, and ethical considerations in machine learning.
- 4) Apply ML algorithms on given data and interpret the results obtained.

Course Outcomes: Students will be able to...

- 1) Develop a good understanding of fundamental principles of machine learning.
- 2) Formulation of a Machine Learning problem.
- 3) Develop a model using supervised/unsupervised machine learning algorithms for classification/prediction/clustering.
- 4) Evaluate performance of various machine learning algorithms on various data sets of a domain.

Module	Title and Contents	Hrs
Module -1:	Foundations of Advanced Machine Learning 1.1 Review of basic ML concepts 1.2 Model Evaluation: Bias-Variance Tradeoff, Cross-validation and Model Selection, and Hyper Parameter Tuning. 1.3 Regularization Techniques: L1, L2, Elastic Net.	07
Module -2:	Ensemble Learning 2.1 Introduction to ensemble learning 2.2 Types of ensemble learning, Bagging, Boosting, Random Forests. Random Forest classifier, random forest regression, Random forest 2.3 Hyper parameters (n-estimator, max-features, max- depth, max-leaf node, max-sample) 2.4 Boosting algorithms: Gradient boosting, XGBoost	08
Module -3:	Basics of Neural Networks and Deep Learning 3.1 Fundamentals of Neural Networks and Backpropagation, Neural network architecture 3.2 Types of Neural network, application of neural network, shallow Neural network. 3.3 Activation Functions and Loss Functions.	08

Module -4:	Ethics in Machine Learning 4.1 Ethics in Machine Learning, Fairness in Machine Learning, Interpretability in Machine Learning 4.2 Bias and Fairness in ML Algorithms. Type of Bias. 4.3 Techniques for Interpretability: LIME and SHAP. 4.4 Interpretable Models: Linear regression, decision trees, and rule- based models are inherently interpretable. Challenges in deploying ML models responsibly.	07
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Reference Books:-

1. Barocas, Solon, Moritz Hardt, and Arvind Narayanan. Fairness and Machine Learning: Limitations and Opportunities. 2019.
2. Nielsen, Michael A. Neural Networks and Deep Learning. Determination Press, 2015.
3. Shalev-Shwartz, Shai, and Shai Ben-David. Understanding Machine Learning: From Theory to Algorithms. Cambridge: Cambridge University Press, 2014.
4. Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. Deep Learning. Cambridge, MA: MIT Press, 2016.
5. Bishop, Christopher M. Pattern Recognition and Machine Learning. New York: Springer, 2006.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20 Marks): • CCE-I 10 Marks : Activity • CCE-II 10 Marks : Activity • CCE-III 10 Marks : MCQ Test (Best of 2 from CCE I, II & III Selected for final Score)	End Semester Examination (30 Marks): • Question -1: Solve the following questions (5 questions of 2 Marks) • Question -2: Attempt Any two out of three questions (3 questions of 10 Marks) • Question -3: Attempt Any Four out of Six questions (6 questions of 5 Marks) (50 Marks converted to 30 marks)
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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester – III

Type : Major Practical

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Web Programming with AI & Advance Machine Learning (BAIP 233)

Practical Batch: 16 Student/ Batch

Course Objectives: Students Should be able to...

- 1) Analyze the skills and project-based experience needed for entry into web application and development careers.
- 2) Learn the key technology components are descriptive languages.
- 3) Learn server-side program elements and client-side program elements.
- 4) Use specific contents that are beneficial for developing web-based solutions.

Course Outcomes: Students will be able to...

- 1) Analyze the history and basic concepts of artificial intelligence.
- 2) Understand the fundamentals of web development including HTML, CSS, and JavaScript.
- 3) Recognize the intersection and potential synergies between web programming and AI.
- 4) Familiar with various tools and frameworks used for integrating AI into web applications.

Module	Title and Contents	Hrs									
	Web Programming with AI	60									
1	Create an HTML document which consist of consists of: Ordered List, Unordered List, Nested List, Image.										
2	Create a table using HTML which consists of columns for Roll No., Student's name and grade. <table><tr><th colspan="3">Result</th></tr><tr><th>Roll No.</th><th>Student's Name</th><th>Grade</th></tr><tr><td></td><td></td><td></td></tr></table>		Result			Roll No.	Student's Name	Grade			
Result											
Roll No.	Student's Name		Grade								
3	Create a form using HTML which has the following types of controls: Text Box, Option/radiobuttons, Check boxes, Reset and Submit buttons										
4	Create HTML documents (having multiple frames) in the following formats: <table><tr><th>Frame 1</th></tr><tr><th>Frame 2</th></tr></table>		Frame 1	Frame 2							
Frame 1											
Frame 2											
5	Create HTML documents (having multiple frames) in the following formats: <table><tr><th colspan="2">Frame 1</th></tr><tr><th>Frame 2</th><th>Frame 3</th></tr></table>	Frame 1		Frame 2	Frame 3						
Frame 1											
Frame 2	Frame 3										
6	Create a static webpage using table tags of HTML.										
7	Create employee registration webpage using HTML form objects.										

60

8	Design a web page, which shows your bio-data using CSS.
9	Create a html program that import an External Cascading Style Sheet (CSS) whereas the style for the html program is defined in CSS file.
10	Create an external style sheet for creating a font family.
11	Design a web page by applying style sheet.
12	Design hometown page using external css
13	Design form using internal CSS
14	Create your class timetable using all css types
15	Design your college's webpage
Advance Machine Learning	
1	Extract data from different file formats and display the summary statistics.
2	Write a program that extracts the words (features) used in a sentence.
3	Implement Min-Max Scaling, Standardization, and Robust Scaling.
4	Recursive Feature Elimination (RFE) be applied to select important features in a dataset.
5	Perform Grid search to improve model performance.
6	Fitting Logistic and Multinomial Logistic regression model on real data set for classification problem.
7	Implementing K-means Clustering.
8	Perform Linear and Quadratic Analysis on real data set for classification problem.
9	Write a program that extracts the words (features) used in a sentence.
10	Reinforcement Learning- a. Calculating Reward b. Discounted Reward
11	Reinforcement Learning- Calculating Optimal quantities
12	Reinforcement Learning- Implementing Q Learning
13	Time Series Analysis- Checking Stationary
14	Time Series Analysis- Converting a non-stationary data to stationary
15	Time Series Analysis- Implementing Dickey Fuller Test

Reference Books:-

1. Patel, Sandeep Kumar. AI for Web Development: Leverage the Power of Machine Learning and Deep Learning to Build Smart Web Applications. Birmingham, UK: Packt Publishing, 2019.
2. Pine, David. Deep Learning for Web Developers: Leverage the Power of Deep Learning to Create and Deploy Neural Network-Driven Web Applications. Birmingham, UK: Packt Publishing, 2018.
3. Watson, Mark. Building Intelligent Web Applications: How to Get Started with Artificial Intelligence-Driven Web Applications. Birmingham, UK: Packt Publishing, 2019.
4. Géron, Aurélien. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. 3rd ed. Sebastopol, CA: O'Reilly Media, 2022.
5. Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. Deep Learning. Cambridge, MA: MIT Press, 2016.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks)

- Journal: 10 Marks
- Student Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks)

- Section I: Attempt any (TWO) questions (10 Marks each)
- Attempt any (TWO) questions (05 Marks each)



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - III

Type : Minor

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: AI for Electronics Application Development (BAIT 234)

Course Objectives: Students Should be able to...

1. Understand AC sources, DC sources and their concept.
2. Learn the number systems and logic gates.
3. Gain knowledge on basic functioning of sensors and display devices.
4. Acquire the knowledge of Embedded.

Course Outcomes: Students will be able to...

1. Design the circuit using AC and DC Sources.
2. Design the Logic gates using Universal gates.
3. Use Sensors and Display in multiple Applications.
4. Describe the fundamental concepts of Raspberry Pi.

Module	Title and Contents	Hrs
Module -1:	Electronics Circuits 1.1 Introduction, AC Sources, DC Sources, Concept of Single Phase and Three phase Power Supplies. 1.2 Types of Electronic Components 1.3 Passive Components: Resistor, Capacitor, Inductor, Transformer. 1.4 Active Components: Diode, Transistor. Ohm's Law.	07
Module -2:	Digital Electronics 2.1 Introduction 2.2 Number Systems-Binary, Octal, Decimal, Hexadecimal 2.3 Logic Gates-AND, OR, NOT, NAND, NOR, Ex-OR, Logic gates using Universal Gates 2.4 Introduction to Boolean algebra, K-map- 2 Variable, 3 Variable.	08
Module -3:	Embedded AI and Sensors interfacing 3.1 What is Embedded AI? Role of sensor in data collections, sensor used in electronics (Temperature, Light, Motion). 3.2 Collecting sensor data using Arduino. 3.3 Introduction to Edge AI devices (ESP32, Raspberry Pi). 3.4 Interfacing of light sensor, temperature sensor to edge AI device and reading data on display.	08
Module -4:	Embedded AI System development. 4.1 AI in electronics product development. 4.2 Real-life examples: AI in washing machines, air conditioners, and quality checking in factories 4.3 Introduction to image recognition using AI (e.g., checking if a PCB is faulty). AI limitation. 4.4 Case study: - AI based temperature controller, AI based Smart Lighting system.	07

Reference Books:-

1. Floyd, Thomas L. Electronic Devices. 10th ed. Upper Saddle River, NJ: Pearson, 2018.
2. Floyd, Thomas L. Digital Fundamentals. 11th ed. Boston: Pearson, 2015.
3. Monk, Simon. Programming Arduino: Getting Started with Sketches. 3rd ed. New York: McGraw-Hill Education, 2020.
4. Upton, Eben, and Gareth Halfacree. Raspberry Pi User Guide. 4th ed. Hoboken, NJ: John Wiley & Sons, 2016.
5. Simek, Milan, and Kumar Ravi. Artificial Intelligence and Embedded Systems. Boca Raton, FL: CRC Press, 2021.

Evaluation Pattern:**Total Marks: 50****Internal Continuous Evaluation (20 Marks):**

- CCE-I 10 Marks: Activity
 - CCE-II 10 Marks: Activity
 - CCE-III 10 Marks: MCQ Test
- (Best of 2 from CCE I, II & III Selected for final Score)

End Semester Examination (30 Marks):

- Question -1: Solve the following questions (5 questions of 2 Marks)
- Question -2: Attempt Any two out of three questions (3 questions of 10 Marks)
- Question -3: Attempt Any Four out of Six questions (6 questions of 5 Marks)
(50 Marks converted to 30 marks)



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - III

Type : Minor

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Relational Database System(BAIT 235)

Course Objectives: Students Should be able to...

- 1) Study the concept Database.
- 2) Understand the operators and command in RDBMS.
- 3) Study the Joins.
- 4) Understand the concept of PL/ SQL statement.

Course Outcomes: Students will be able to...

- 1) Design relational database schemas using ER diagrams and normalization techniques.
- 2) Create and manage databases using SQL (DDL, DML, DCL, and TCL commands).
- 3) Develop complex SQL queries using joins, subqueries, functions, views, and indexes.
- 4) Explain transaction management, concurrency control, recovery techniques, and database security.
- 5) Design and implement database solutions for real-world applications using RDBMS concepts.

Module	Title and Contents	Hrs
Module -1:	Introduction to RDBMS 1.1 Concept of RDBMS, Difference between DBMS and RDBMS, Features of RDBMS 1.2 Terminologies: Relation, attribute, domain, Tuple, Entities, Degree, Codd's Rules 1.3 Relational Model: Structure of Relational Database 1.4 Concept of Relational Algebra, Role and Responsibilities of DBA.	07
Module -2:	Basics of SQL 2.1 Features of SQL, Data types, Difference between various platforms for SQL 2.2 Integrity Constraints- (Primary key, foreign key, unique key, not null, default, check), DDL, DML, DCL, TCL Commands 2.3 Select Statement with Clauses- Where, Having, Order by, Group by 2.4 SQL Operators-Arithmetic, Relational, Logical, Like, Between, Functions in SQL (Aggregate functions, String Functions)	08
Module -3:	Joins And Sub queries in SQL 3.1 Join types - Inner Join, Outer Join, Cross Join and self-Join, Sub- queries 3.2 Multiple sub queries, nesting of sub queries 3.3 sub queries in DML commands, correlated sub queries 3.4 Create Indexes, Sequences, Views	08

Module -4:	PL/SQL control statements and stored procedures 4.1 Introduction to PL/SQL Block Structure 4.2 Control Structures- Branching, statements, Iterative Control statements 4.3 Stored procedures–Creating and executing procedures with and without parameters 4.4 Cursors –Concept, Types- Implicit, Explicit, Procedure to create explicit cursors, TRIGGERS: Concept and types	07
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Reference Books:-

1. Elmasri, Ramez, and Shamkant B. Navathe. Fundamentals of Database Systems. 7th ed. Boston: Pearson, 2016.
2. Silberschatz, Abraham, Henry F. Korth, and S. Sudarshan. Database System Concepts. 7th ed. New York: McGraw-Hill Education, 2019.
3. Oracle Corporation. Oracle Database PL/SQL Language Reference. Redwood City, CA: Oracle Corporation, 2023.
4. Beaulieu, Alan. Learning SQL: Generate, Manipulate, and Retrieve Data. 3rd ed. Sebastopol, CA: O'Reilly Media, 2020.
5. Oppel, Andy. Database: A Beginner's Guide. New York: McGraw-Hill Education, 2015.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20 Marks):

- CCE-I 10 Marks: Activity
 - CCE-II 10 Marks: Activity
 - CCE-III 10 Marks: MCQ Test
- (Best of 2 from CCE I, II & III Selected for final Score)

End Semester Examination (30 Marks):

- Question -1: Solve the following questions (5 questions of 2 Marks)
- Question -2: Attempt Any two out of three questions (3 questions of 10 Marks)
- Question -3: Attempt Any Four out of Six questions (6 questions of 5 Marks)
(50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - III

Type : Minor practical

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Relational Database System & AI for Electronics
Application Development (BAIP 236)
Practical Batch: 16 Student/ Batch

Course Objectives: Students Should be able to...

- 1) To study the concept Database.
- 2) To understand the operators and command in RDBMS.
- 3) To study the Joins.
- 4) To understand the concept of PL/ SQL statement.

Course Outcomes: Students will be able to...

- 1) Apply normalization techniques to improve database design.
- 2) Use various control structures to improve programming logic.
- 3) Design class and object.
- 4) Use constructor and destructor.

Module	Title and Contents	Hrs
	AI for Electronics Application Development	
1	Study of Electronics components.	
2	Study of CRO.	
3	Verification of Ohm's law.	
4	Study of I-V characteristics of PN junction Diode.	
5	Study of Half wave and Full wave Rectifier.	
6	Study of Arduino IDE software.	
7	Design and study Regulated of 5v power supply.	
8	Study of Logic Gates.	
9	Basic gates using NAND gate.	
10	Basic gates using NOR gate.	
11	Study of CPU and I/O devices	
12	Study of various memory devices	
13	Study of strain gauge	
14	Study of keli simulator	
15	Study of temperature sensor using LM35	
	List of experiment (RDBMS)	
1	Create the tables with appropriate constraints	
2	Creating a Database Viewing all Tables in a Database	
3	Creating Tables (With and Without Constraints)	
4	Perform the following : Inserting/Updating/Deleting Records in a table	
5	Perform the following: Saving (Commit) and Undoing(rollback)	
6	Perform the following: Altering a Table	
		60

7	Perform the following: Dropping/Truncating/Renaming Tables
8	Perform the following: Simple Queries with Aggregate functions
9	Perform the following: Queries with group by and having clause
10	Perform the following: Aggregate, Date Functions, String, Math
11	Creating queries on Joins
12	Creating Views and index.
13	Creating stored procedure with and without parameters
14	Creating Cursor with and without parameters
15	Creating triggers with and without parameters

Reference Books:-

- 1) Fundamental Electrical and Electronic Principles by Jo Verhaevert, 4th ed., published 2024.
- 2) ABCs of Electronics: An Easy Guide to Electronics Engineering by Farzin Asadi, published 2024.
- 3) Elmasri, Ramez, and Shamkant B. Navathe. Fundamentals of Database Systems. 7th ed. Boston: Pearson, 2016.
- 4) Database Design and Modeling with PostgreSQL and MySQL by Alkin Tezuysal & Ibrar Ahmed, Packt Publishing, released July 2024.
- 5) Database Management Systems by Rohit Khurana, Pearson India, released May 2024.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks)	Practical Exam Paper (30 Marks)
- Journal: 10 Marks - Student Performance: 05 Marks - Viva: 05 Marks	- Section I: Attempt any (TWO) questions (10 Marks each) - Attempt any (TWO) questions (05 Marks each)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - III

Type : VSC Practical

Marks: 100 /50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: FIGMA Techniques(BAIPVSC I)

Practical Batch: 16 Student/ Batch

Course Objectives: Students Should be able to...

- 1) Understand and explore the Figma interface and tools for UI/UX design.
- 2) Develop essential skills in creating layouts using shapes, text, and grids.
- 3) Design wireframes and user interface components for web and mobile platforms.
- 4) Apply design principles like hierarchy, alignment, and visual consistency.

Course Outcomes: Students will be able to...

- 1) Navigate and use the Figma interface to design user interfaces.
- 2) Create responsive and adaptive layouts using frames and grids.
- 3) Design and organize UI elements like buttons, cards, and forms using Auto Layout.
- 4) Build interactive prototypes with page linking and animations.

Module	Title and Contents	Hrs
1	Create a new Figma project, explore the interface, and set up a frame.	60
2	Design a simple layout using rectangles, circles, and text layers.	
3	Apply solid colors, gradients, and opacity settings to elements.	
4	Experiment with fonts, sizes, spacing, and text alignment.	
5	Use grids, rulers, and alignment tools for structured layouts.	
6	Design a basic wireframe for a homepage layout.	
7	Design a simple mobile app wireframe with navigation.	
8	Create a flexible button or card component using Auto Layout.	
9	Design reusable UI components like buttons and input fields.	
10	Link pages and add navigation between screens.	
11	Create a homepage layout with a header, hero section, and footer.	
12	Design a user-friendly login form with input fields and buttons.	
13	Create a top navigation bar with dropdown menus.	
14	Create a contact form with text fields, buttons, and icons.	
15	Design a mobile version of a webpage with adaptive layouts.	
16	Use Smart Animate for button hover effects.(Adding Animations & Hover Effects)	

17	Create and link multiple pages for a complete website.	
18	Share a design with team members and add comments.(Using Hosting)	
19	Export images, icons, and styles for developers.(Exporting Assets for Development)	
20	Design a Complete Website (Apply all concepts to design a full website.)	

Reference Books:-

1. Krug, Steve. Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability. 3rd ed. Berkeley, CA: New Riders, 2014.
2. Tidwell, Jenifer. Designing Interfaces: Patterns for Effective Interaction Design. 3rd ed. Sebastopol, CA: O'Reilly Media, 2020.
3. Norman, Don. The Design of Everyday Things: Revised and Expanded Edition. New York: Basic Books, 2013.
4. Wroblewski, Luke. Web Form Design: Filling in the Blanks. New York: Rosenfeld Media, 2008.
5. Marcotte, Ethan. Responsive Web Design. New York: A Book Apart, 2011.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks) • Journal: 10 Marks • Student Performance: 05 Marks - Viva: 05 Marks	Practical Exam Paper (30 Marks) • Section I: Attempt any (TWO) questions (10 Marks each) • Attempt any (TWO) questions (05 Marks each)
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Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - III

Type : SEC Practical

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: OpenCV for AI Solutions (BAIPSEC I)

Practical Batch: 16 Student/ Batch

Course Objectives: Students Should be able to...

- 1) Analyze the basics of computer vision and its applications in AI solutions.
- 2) Learn how to use OpenCV library for image and video processing.
- 3) Implement various image processing techniques such as filtering, edge detection, and morphological operations.
- 4) Explore feature detection and description methods for object detection and recognition.

Course Outcomes: Students will be able to...

- 1) Proficiency in using OpenCV library for various computer vision tasks.
- 2) Ability to implement image processing techniques for preprocessing and enhancing images.
- 3) Competence in feature detection and description for object recognition.
- 4) Understanding of advanced concepts like image segmentation and motion tracking.

Module	Title and Contents	Hrs
1	Understanding the fundamentals of computer vision, Introduction and installation of the OpenCV library.	60
2	Learn how to access and read an image file in Python with the help of OpenCV.	
3	Import an image from the computer and show it on the screen using OpenCV's imshow() function.	
4	Load an image and use OpenCV's imwrite() function.	
5	Saving an Image using opencv.	
6	Program to use cv2.line() method	
7	Program to implement Arithmetic Operations on Images using OpenCV.	
8	Program to implement Bitwise Operations on Binary Images.	
9	Implementation and Comparative Analysis of Advanced Image Blurring Techniques Using OpenCV	
10	Implementation of Grayscale Conversion and Advanced Grayscale Image Processing Using OpenCV	
11	Implementation and Comparative Analysis of Image Resizing Using Different Interpolation Methods	
12	Implementation of Image Rotation and Geometric Transformations Using OpenCV	
13	Write a program to implement stacking multiple images.	
14	Program to implement write text on an image using cv2.putText().	
15	Working with Videos using OpenCV libraries.	

16	Writing Text on live Video using OpenCV libraries.
17	Implementing Image Processing Operations.
18	Program to Implement Object detection and tracking.
19	Program to Flip an image horizontally or vertically.
20	Background Removal and Replacement Using Image Editing Software

Reference Books:-

1. Bradski, Gary, and Adrian Kaehler. Learning OpenCV 3: Computer Vision in C++ with the OpenCV Library. Sebastopol, CA: O'Reilly Media, 2017.
2. Szeliski, Richard. Computer Vision: Algorithms and Applications. 2nd ed. Cham, Switzerland: Springer, 2022.
3. Rosebrock, Adrian. Deep Learning for Computer Vision with Python: Starter Bundle. PyImageSearch, 2017.
4. Gonzalez, Rafael C., and Richard E. Woods. Digital Image Processing. 4th ed. New York: Pearson, 2018.
5. Raschka, Sebastian, and Vahid Mirjalili. Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2. Birmingham, UK: Packt Publishing, 2019.

Evaluation Pattern:

Total Marks: 25

Internal Evaluation (20 Marks)	Practical Exam Paper (30 Marks)
• Journal: 10 Marks • Student Performance: 05 Marks • Viva: 05 Marks	• Section I: Attempt any (TWO) questions (10 Marks each) • Attempt any (TWO) questions (05 Marks each)

SEM - IV



Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - IV

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Algorithms in Artificial Intelligence(BAIT 241)

Course Objectives: Students Should be able to...

- 1) Understand the fundamental concepts of Artificial Intelligence and its various
- 2) Develop skills in designing, analyzing, and implementing AI algorithms for problem solving
- 3) Explore advanced topics such as machine learning, natural language processing, and optimization in AI
- 4) Understand intelligent decision-making techniques.

Course Outcomes: Students will be able to...

- 1) Analyze problems suitable for AI solutions.
- 2) Understand designing and implementing AI algorithms using appropriate techniques.
- 3) Learn evaluating the performance of AI algorithms and selecting the most suitable ones for specific tasks.
- 4) Explore AI algorithms to various domains such as machine learning, natural language processing, and optimization.

Module	Title and Contents	Hrs
Module -1:	Introduction to Algorithms in Artificial Intelligence 1.1 Definition and significance of algorithms in artificial intelligence, Basic components of an algorithm: input, output, control structures 1.2 Introduction to problem-solving techniques in AI: search, knowledge representation, reasoning 1.3 Overview of algorithm design paradigms: greedy algorithms, divide and conquer, dynamic programming 1.4 Introduction to algorithm analysis: time complexity, Space complexity.	07
Module -2:	Search Algorithms 2.1 Introduction to search algorithms: depth-first search, breadth-first search, 2.2 Heuristic search techniques: A* search, hill climbing, simulated annealing, 2.3 Overview of informed vs. uninformed search algorithms 2.4 Application of search algorithms in problem-solving: puzzle solving, pathfinding, optimization problems, Analysis of search algorithms: time and space complexity considerations.	08
Module -3:	Programming in Logic (PROLOG) 3.1 Introduction to Prolog: Understanding the principles of logic programming, Syntax and Numeric Function, 3.2 Contrasting Prolog with imperative programming languages Syntax and structure of Prolog programs, Facts, rules, and queries, Variables, atoms, and predicates 3.3 Working with lists in Prolog, writing recursive predicates, List manipulation and pattern matching 3.4 Conditional statements (if-then-else), Cut operator (!) and its implications,	08

Module -4:	Expert systems 4.1 Introduction, basic concepts, structure, the human element in expert systems, how expert systems work, problem areas addressed by expert systems, expert systems success factors 4.2 Types of expert systems, expert systems and the internet, interaction with web, knowledge engineering, scope of knowledge, difficulties in knowledge acquisition 4.3 Methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts 4.4 Reasoning in artificial intelligence: inference with rules, with frames, model-based reasoning, case-based reasoning, explanation & meta-knowledge, inference with uncertainty, representing uncertainty.	08
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Reference Books:-

1. Russell, Stuart, and Peter Norvig. Artificial Intelligence: A Modern Approach. 3rd ed. Upper Saddle River, NJ: Pearson, 2015.
2. Murphy, Kevin P. Machine Learning: A Probabilistic Perspective. Cambridge, MA: MIT Press, 2015.
3. Bird, Steven, Ewan Klein, and Edward Loper. Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit. Sebastopol, CA: O'Reilly Media, 2016.
4. Eiben, Agoston E., and J. E. Smith. Introduction to Evolutionary Computing. 2nd ed. Berlin: Springer, 2016.
5. Eberhart, Russell C., and Yuhui Shi. Swarm Intelligence. Burlington, MA: Morgan Kaufmann, 2017.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation: (20 Marks) • CCE-I: 10 Marks: Activity • CCE-II: 10 Marks: Activity • CCE-III: MCQ Test (Best of 2 from CCE I, CCE II & CCE III Selected for final score)	End Semester Examination (30 Marks): • Question -1: Solve the following questions (5 questions of 2 Marks) • Question - 2: Attempt any two (3 questions of 10 marks) • Question – 3: Attempt any four (6 questions of 05 marks) (50 Marks converted to 30 marks)
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Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - IV

Type : Major

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Object Oriented Programming for AI(BAIT 242)

Course Objectives: Students Should be able to...

- 1) Understand of the history, features, and architecture of the Java programming language.
- 2) Familiar with the structure of Java programs and the compilation and execution process
- 3) Explore knowledge on control structures such as branching and iterative statements in Java
- 4) Apply classes, objects, inheritance, polymorphism, encapsulation, and abstraction.

Course Outcomes: Students will be able to...

- 1) Understand of exception handling mechanisms and multithreading concepts in Java.
- 2) Analyze to design and implement object-oriented solutions to programming problems
- 3) Learn utilizing Java API packages and user-defined packages
- 4) Explore handling exceptions and managing multithreaded applications in Java.

Module	Title and Contents	Hrs
Module -1:	Introduction to Java Programming Language 1.1 History and features of Java, Java Virtual Machine (JVM), JDK tool, Structure of Java program, compilation and execution of Java program Introduction to problem-solving techniques in AI: search, knowledge representation, reasoning 1.2 Java keywords, Data types, Java variables – declaration and assigning values to variables (using assignment statement and Scanner class object), scope of variables 1.3 Type casting – Implicit and Explicit casting, Operators of Java, 1.4 Control structures of Java: Branching statements – if, if...else, if...else if, and switch statement; Iterative statements – for loop, do...while, while loop, for-each loop; Jumping statements – break and continue statement.	08
Module -2:	Introduction to Object Oriented Concepts in java 2.1 Introduction Classes, Objects and methods, defining a class, field declaration, method declaration, accessing class members, access specifiers in Java 2.2 Static variables and methods, Method overloading, Constructor – types of constructors, constructor overloading, Use of this keyword, 2.3 Garbage collection, finalize() method, Wrapper classes, Array – types of array, array of objects, 2.4 Collection – Iterator interface, List interface, ArrayList class, LinkedList class, Vector class, and Stack class.	07

Module -3:	Inheritance, packages and interfaces 3.1 Inheritance – definition, syntax, types of inheritance, Method overriding, use of super keyword 3.2 Syntax and structure of Prolog programs, Facts, rules, and queries, Variables, atoms, and predicates 3.2 Difference between method overloading and overriding, Dynamic method dispatch, 3.3 Abstract class and method, use of final keyword 3.4 Interface – defining and implementing interface, implementation of multiple inheritance using Interface, difference between abstract class and interface.	07
Module -4:	Exception Handling and Multithreading 4.1 Concept of exception, difference between error and exception, Types of exceptions – checked and unchecked 4.2 Exception handling using try and catch block, Multiple catch block, finally block, throws keyword, User-defined exception 4.3 Methods Concept of multithreading in Java, Difference between process and thread, Creating thread by extending Thread class and by implementing Runnable interface, 4.4 Life cycle of thread, Thread class methods – start(), run(), yield(), suspend(), resume(), sleep(), wait(), notify(), stop(), Thread synchronization.	08

Reference Books:-

1. Sierra, Kathy, and Bert Bates. Head First Java. 3rd ed. Sebastopol, CA: O'Reilly Media, 2016.
2. Schildt, Herbert. Java: The Complete Reference. 10th ed. New York: McGraw-Hill Education, 2017.
3. Horstmann, Cay S. Core Java Volume I—Fundamentals. 11th ed. Hoboken, NJ: Pearson, 2018.
4. Bloch, Joshua. Effective Java. 3rd ed. Boston: Addison-Wesley Professional, 2018.
5. Goetz, Brian, Tim Peierls, Joshua Bloch, Joseph Bowbeer, David Holmes, and Doug Lea. Java Concurrency in Practice. Boston: Addison-Wesley Professional, 2018.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation: (20 Marks)

- CCE-I: 10 Marks: Activity
- CCE-II: 10 Marks: Activity
- CCE-III: MCQ Test

(Best of 2 from CCE I, CCE II & CCE III Selected for final score)

End Semester Examination (30 Marks):

- Question -1: Solve the following questions (5 questions of 2 Marks)
- Question - 2: Attempt any two (3 questions of 10 marks)
- Question – 3: Attempt any four (6 questions of 05 marks)
(50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - IV

Type : Major Practical

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Algorithms in Artificial Intelligence & Object-Oriented Programming for AI (BAIP 243)
Practical Batch: 16 Student/ Batch

Course Objectives: Students Should be able to...

- 1) Analyze fundamental problem-solving techniques and algorithms.
- 2) Familiar with different problem domains and their corresponding algorithms.
- 3) Develop ability to design and implement algorithms using a programming language.
- 4) Enhance critical thinking and logical reasoning skills through problem-solving exercises.

Course Outcomes: Students will be able to...

- 1) Understand and apply basic problem-solving strategies such as divide and conquer, greedy algorithms, and dynamic programming.
- 2) Implement various search and traversal algorithms such as breadth-first search, depth-first search, and binary search.
- 3) Develop algorithms for solving classic problems such as sorting, graph traversal, and pathfinding.
- 4) Learn utilizing Java API packages and user-defined packages

Module	Title and Contents	Hrs
1	Write a Program to Implement Breadth First Search using Python.	60
2	Write a Program to Implement Depth First Search using Python.	
3	Write a Program to Implement Water-Jug problem using Python.	
4	Write a Program to Implement Travelling Salesman Problem using Python.	
5	Write a Program to Implement Tower of Hanoi Problem using Python.	
6	Write a Program to Implement Monkey Banana Problem using Python.	
7	Write a Program to Implement Alpha-Beta Pruning using Python.	
8	Write a prolog program to find the maximum of two numbers.	
9	Write a prolog program to calculate the factorial of a given number.	
10	Write a prolog program to check number is prime or not.	
11	Create a Prolog program to calculate the sum of elements in a list.	
12	Write a Prolog program to check if a given number is even or odd.	
13	Develop a Prolog program that takes input from the user and outputs whether the input is a prime number or not.	
14	Write a Prolog program to List Manipulation and Pattern Matching	
15	Write a prolog program to print Fibonacci series.	
Object Oriented Programming for AI		60
1	Write a program to check if a number is prime.	

2	Write a program to reverse a string without using inbuilt functions.
3	Write a Java program to swap two numbers without using a third variable.
4	Write a program to find the largest of three numbers.
5	Write a program to print Fibonacci series up to n terms.
6	Program on method overloading.
7	Program on Constructor and constructor overloading.
8	Program to create Array.
9	Program on Collection.
10	Program on single inheritance.
11	Program on multilevel inheritance.
12	Program on hierarchical inheritance.
13	Program on method overloading.
14	Program on method overriding.
15	Program on abstraction

Reference Books:-

6. Russell, Stuart J., and Peter Norvig. Artificial Intelligence: A Modern Approach. 4th ed. Hoboken, NJ: Pearson, 2021.
7. Phillips, Dusty. Python 3 Object-Oriented Programming: Build Robust and Maintainable Software with Object-Oriented Design Patterns in Python 3.8. 3rd ed. Birmingham: Packt Publishing, 2018. PPackt Publishing
8. Poole, David L., and Alan K. Mackworth. Artificial Intelligence: Foundations of Computational Agents. 3rd ed. Cambridge: Cambridge University Press, 2023.
9. Negnevitsky, Michael. Artificial Intelligence: A Guide to Intelligent Systems. 3rd ed. Harlow: Pearson, 2011.
10. Lutz, Mark. Learning Python. 5th ed. Sebastopol, CA: O'Reilly Media, 2013.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks)

- Journal: 10 Marks
- Student Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks)

- Section I: Attempt any (TWO) questions (10 Marks each)
- Attempt any (TWO) questions (05 Marks each)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - IV

Type : Minor

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: AI applications for Internet of things(BAIT244)

Course Objectives: Students Should be able to...

- 1) Learn what Arduino is, how it works, and how to set it up.
- 2) Understand different types of Arduino boards and how to write basic programs for them using C language.
- 3) Learn how wireless communication works, especially using the ESP8266 Wi-Fi module.
- 4) Set up a web server and send data from sensors to the internet or cloud.

Course Outcomes: Students will be able to...

- 1) Design the different program using Arduino.
- 2) Describe and demonstrate the wireless networks.
- 3) Analyze the various applications using different sensors with Arduino.
- 4) Describe the fundamental concepts of IoT.

Module	Title and Contents	Hrs
Module -1:	Basics of Arduino 1.1 Overview of Arduino, Arduino Board description 1.2 Types of Arduino 1.3 Installing the Arduino IDE 1.4 C Programming for Arduino, Variables, data types, and operators.	07
Module -2:	Wireless Networking 2.1 Basics of Wireless Networking, Introduction to ESP8266 Wi-Fi Module 2.2 Various Wi-Fi library 2.3 Web server: Introduction, Installation, configuration 2.4 Posting sensors(s) data to web server. Interfacing ESP8266 with Web Server, Cloud	08
Module -3:	Interfacing with Arduino: Case Study 3.1 Interfacing of Temperature, Humidity, Motion, 3.2 Light and Gas sensor with Arduino 3.3 Interfacing of Actuators with Arduino 3.4 Interfacing of LED, Relay switch, LCD, and DC motor with Arduino, etc	08
Module -4:	Developing of IoT 4.1 Introduction of Internet of Things (IoT), Overview of IoT 4.2 IoT architecture 4.3 IoT protocols 4.4 Applications of IoT – Consumer, Manufacturing, Environmental, Healthcare, Education applications	07

Reference Books:-

1. Margolis, Michael. Arduino Cookbook. 2nd ed. Sebastopol, CA: O'Reilly Media, 2011.
2. Banzi, Massimo. Getting Started with Arduino. 2nd ed. Sebastopol, CA: O'Reilly Media, 2011.
3. Turner, Ryan. Arduino Programming. N.B.L. International, 2020.
4. Madiseti, Vijay, and Arshdeep Bahga. Internet of Things: A Hands-On Approach. Hyderabad: VPT, 2014.
5. Aggarwal, Charu C. Neural Networks and Deep Learning: A Textbook. Cham: Springer, 2018.

Evaluation Pattern:**Total Marks: 50****Internal Continuous Evaluation: (20 Marks)**

- CCE-I: 10 Marks: Activity
- CCE-II: 10 Marks: Activity
- CCE-III: MCQ Test
(Best of 2 from CCE I, CCE II & CCE III
Selected for final score)

End Semester Examination (30 Marks):

- Question -1: Solve the following questions
(5 questions of 2 Marks)
- Question - 2: Attempt any two
(3 questions of 10 marks)
- Question – 3: Attempt any four
(6 questions of 05 marks)
(50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - IV

Type : Minor

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: AI-Enhanced Software Engineering(BAIT 245)

Course Objectives: Students Should be able to...

- 1) Learn concepts of Software Engineering Lifecycle models.
- 2) Analyze Software requirement specifications and the SRS documents.
- 3) Design and development solutions with proper analysis.
- 4) Understand the role of Artificial Intelligence in software engineering.

Course Outcomes: Students will be able to...

- 1) Understand software engineering principles and SDLC models.
- 2) Analyse user requirements and develop SRS documents.
- 3) Design software architecture and models using UML and design methodologies.
- 4) Evaluate software quality through testing, verification, validation, and quality assurance techniques.

Module	Title and Contents	Hrs
Module -1:	Introduction to Software engineering 1.1 Introduction to Software Engineering - Software Development Life Cycle 1.2 Waterfall Model-Prototyping Model-Spiral Model 1.3 boxing model Requirements Analysis and Specification 1.4 Problems without a SRS document-Decision Tree	07
Module -2:	System Design 2.1 Software Design-Software Design Strategies 2.2 Software Analysis & Design Tool 2.3 Structured Design-Object Modelling Using UML- Use Case Diagram-Class Diagrams 2.4 Deployment Diagram-Activity and State Chart Diagram	08
Module -3:	Project Model 3.1 Software Project Planning, COCOMO Model 3.2 Staffing Level Estimation, Project Scheduling, Organization Structure 3.3 Risk Management 3.4 Computer Aided Software Engineering, Software Reuse.	07
Module -4:	Testing and Maintenance 4.1 Definition- verification and validation 4.2 Types of testing: Black box and white box testing 4.3 Unit testing, integration testing 4.4 definition of maintenance, type of maintenance	08

Reference Books:-

1. Franch, Xavier, Jordi Marco, and Xavier Oriol. Artificial Intelligence for Software Engineering: Methods, Tools, and Applications. Cham: Springer, 2020.
2. Margolis, Michael. Arduino Cookbook. 2nd ed. Sebastopol, CA: O'Reilly Media, 2011.
3. Selman, Bart, and Tim Menzies. AI in Software Engineering. Berkeley, CA: Apress, 2019.
4. Tian, Jeff, and Barry Boehm. Software Engineering for AI-Driven Systems. Boca Raton, FL: CRC Press, 2020.
5. Haynes, Carl. Machine Learning for Software Engineers. Birmingham, UK: Packt Publishing, 2019.

Evaluation Pattern:**Total Marks: 50****Internal Continuous Evaluation: (20 Marks)**

- CCE-I: 10 Marks: Activity
- CCE-II: 10 Marks: Activity
- CCE-III: MCQ Test
(Best of 2 from CCE I, CCE II & CCE III
Selected for final score)

End Semester Examination (30 Marks):

- Question -1: Solve the following questions
(5 questions of 2 Marks)
- Question - 2: Attempt any two
(3 questions of 10 marks)
- Question – 3: Attempt any four
(6 questions of 05 marks)
(50 Marks converted to 30 marks)



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - IV

Type : Minor Practical

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: AI applications for Internet of things and AI-Enhanced Software Engineering(BAIP 246)
Practical Batch: 16 Student/ Batch

Course Objectives: Students Should be able to...

- 1) Gain knowledge on basic functioning of Arduino.
- 2) Study the wireless network and web server.
- 3) Understand the knowledge regarding Applications of Arduino.
- 4) Learn Fundamental concepts of IoT.

Course Outcomes: Students will be able to...

- 1) Design the different program using Arduino.
- 2) Demonstrate the wireless networks.
- 3) Analyze the various applications using different sensors with Arduino.
- 4) Learn the fundamental concepts of IoT.

Module	Title and Contents	Hrs
1	Study of Arduino IDE and Arduino Boards	
2	Programming Arduino to blink LED	
3	Analog Input Sketch (Bar Graph with LEDs & Potentiometer)	
4	Programming Arduino Pulse Width Modulation	
5	LCD interfacing with Arduino.	
6	Motion Sensor interfacing with Arduino.	
7	Relay interfacing with Arduino.	
8	DC motor interfacing with Arduino	
9	Temperature sensor module interfacing with Arduino	
10	Pressure sensor module interfacing with Arduino	
11	Bluetooth module interfacing with Arduino	
12	Wi-Fi module interfacing with Arduino	
13	GSM module interfacing with Arduino	
14	Demonstration on IOT Architecture.	
15	Home appliances control by using Arduino.	
AI-Enhanced Software Engineering		60
1	Software Requirement Analysis: Preparation of Software Requirement Specification Document.	
2	Create a Simple Software Requirements Specification (SRS) Document	
3	Case Study: Identify Problems in Software Projects Without an SRS	
4	Construct a Decision Tree for a Simple Problem	
5	Data Dictionary: Use work products data dictionary.	

6	Data Modeling: Develop E-R Models.
7	Data Modeling: Develop the Data Flow Diagram (DFD).
8	Software Designing: Develop use case diagrams.
9	Software Designing: Develop the activity diagrams.
10	Software Designing: Develop the class diagrams.
11	Software Designing: Develop the sequence diagrams.
12	Software Designing: Develop the Component Diagrams.
13	Software Designing: Develop the Deployment Diagram.
14	Prepare a Verification and Validation Checklist
15	Integration Testing on Two Interacting Modules

Reference Books:-

1. Margolis, Michael. Arduino Cookbook. 2nd ed. Sebastopol, CA: O'Reilly Media, 2011.
2. Banzi, Massimo. Getting Started with Arduino. Sebastopol, CA: O'Reilly Media, 2009.
3. Turner, Ryan. Arduino Programming. N.B.L. International, 2020.
4. Madiseti, Vijay, and Arshdeep Bahga. Internet of Things: A Hands-On Approach. Hyderabad: VPT, 2014.
5. Franch, Xavier, Jordi Marco, and Xavier Oriol. Artificial Intelligence for Software Engineering: Methods, Tools, and Applications. Cham: Springer, 2020.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks) • Journal: 10 Marks • Student Performance: 05 Marks • Viva: 05 Marks	Practical Exam Paper (30 Marks) • Section I: Attempt any (TWO) questions (10 Marks each) • Attempt any (TWO) questions (05 Marks each)
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Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Interdisciplinary Studies

Programme: B.Sc.

Semester – IV

Type: Open Elective Course

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course & Code: Human Psychology(BAIPOE IV)

Course Objectives: Students should be able to...

1. Gain hands-on experience in administering, scoring, and interpreting a variety of psychological tests.
2. Understand the theoretical foundations and purposes of different psychological assessments (e.g., intelligence, personality, aptitude, motivation, attitudes, and emotions).
3. Develop practical skills in observing, recording, and analysing human behaviour.
4. Apply ethical principles and maintain confidentiality while conducting psychological assessments.

Course Outcomes: Students will be able to...

1. Administer, score, and interpret various psychological tests accurately.
2. Demonstrate understanding of the theoretical basis and purpose of different psychological assessments.
3. Analyse and evaluate human behaviour using practical test data.
4. Apply ethical standards and maintain confidentiality in psychological testing.

Module	Title and Contents (Any 15 of the following)	Hrs.
	1. To assess self-concept of the subject. 2. To assess the stress level of an individual 3. To assess the aggression of the subject 4. To assess the Emotional Intelligence of the subject 5. To assess the Adjustment level of subject 6. To assess the Achievement Motivation of the subject. 7. To assess the depression level of subject. 8. To assess anxiety of the subject. 9. To assess the Study Habits of the subject 10. To assess Intelligence of an individual. 11. To assess the Social adjustment level of subject. 12. To assess the Life satisfaction of the subject 13. To assess Self-confidence of the subject 14. To assess Academic stress of the students 15. Field Visit 16. Field Visit 17. Survey Report	60

Reference books:

1. Verma, S. & Gupta, A. (2010). *Handbook of Psychological Assessment in India*. Delhi: National Psychological Corporation.
2. Rao, S.N. (2011). *Manual of Psychological Testing in Indian Context*. Mumbai: Himalaya Publishing House.
3. Chadha, N.K. (2009). *Applied Psychometry*. SAGE Publications India.
4. Aiken, Lewis R. *Psychological Testing and Assessment*. 12th ed. Boston: Pearson, 2009.
5. Anastasi, Anne, and Susana Urbina. *Psychological Testing*. 7th ed. Upper Saddle River, NJ: Prentice Hall, 1997.
6. Bartol, Curt R., and Anne M. Bartol. *Introduction to Forensic Psychology: Research and Application*. 6th ed. Thousand Oaks, CA: SAGE Publications, 2021.

Evaluation Pattern:**Total Marks: 50****Internal Evaluation (20 Marks)**

- Journal: 10 Marks
- Student Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks)

- Section I: Attempt any(TWO) questions
(10 Marks each)
- Attempt any (TWO) questions
(05 Marks each)



Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - IV

Type : VSC Practical

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Desktop Publishing (BAIPVSC II)
Practical Batch: 16 Student/ Batch

Course Objectives: Students Should be able to...

- 1) Develop and applying Principals for photoshop.
- 2) Gain deep knowledge of Adobe photoshop cs2.
- 3) Analyses the fundamental concepts of photo editing.
- 4) Understand equipment functions and library resources related to the study of photoshop.

Course Outcomes: Students will be able to...

- 1) Understand and demonstrate in between drawing and execution with squash and stretch, staging, arc, principle.
- 2) Create organize content and sequences for photo editing.
- 3) Demonstrate a thorough understanding of the elements of photoshop design.
- 4) Utilized concepts of elements and colors in photoshop.

Module	Title and Contents	Hrs
1	Draw the elements of design: (line, shape, etc.)	60
2	Draw the elements of design (Forms, space)	
3	Use multiple Shades of colors.	
4	Browse the image in Adobe Photoshop.	
5	Resize the image in Adobe Photoshop.	
6	Perform the properties of image in photoshop.	
7	Redesign an existing image.	
8	Design the logo.	
9	Drawing and sketching the image and logo.	
10	Sketching of natural and manmade objects and environment.	
11	Sketching of representational Drawing.	
12	Draw the image.	
13	Use color Correction property on images.	
14	Add the Text property in Adobe photoshop.	
15	Browse the image and use effects in Adobe photoshop.	
16	Draw the shapes using pen tool.	
17	Add the text using text tool and on it.	
18	Add effect on text.	
19	Adding transitions in Adobe photoshop.	
20	Add the customizing transitions in Adobe photoshop.	

Reference Books:-

1. Steve Caplin, Art and Design in Photoshop: How to Simulate Just About Anything from Great Works of Art to Urban Graffiti, 1st Edition, Routledge, 2008.
2. Adobe Photoshop, V&S Publishers, Latest Revised Edition, 2013. ISBN-13: 9789350578056
3. Photoshop CS6 in Simple Steps, Dreamtech Press, 2012. ISBN-13: 9789350045978
4. Dr. Pankaj Dadhich, Desktop Publishing for Beginners, Kindle Edition, 2023. Amazon Link
5. Cohen, Sandee. InDesign CC: Visual QuickStart Guide. Berkeley, CA: Peachpit Press, 2012.

Evaluation Pattern:**Total Marks: 50****Internal Evaluation (20 Marks)**

- Journal: 10 Marks
- Student Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks)

- Section I: Attempt any (TWO) questions
(10 Marks each)
- Attempt any (TWO) questions
(05 Marks each)



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Artificial Intelligence

Programme: B.Sc.

Semester - IV

Type : SEC Practical

Marks: 50

Credits : 2

From: A. Y. 2025-26

Name of the Course & Code: Data Analytics using R Programming (BAIPSEC II)

Practical Batch: 16 Student/ Batch

Course Objectives: Students Should be able to...

- 1) Learn the fundamental concepts of programming with R.
- 2) Understand data structures in R and their manipulation.
- 3) Gain proficiency in data import and export using R.
- 4) Analyses basic data visualization techniques in R.

Course Outcomes: Students will be able to...

- 1) Demonstrate proficiency in programming in the R language.
- 2) Manipulate and analyze data effectively using R.
- 3) Create data visualizations for exploratory analysis and presentation.
- 4) Apply statistical methods and machine learning algorithms using R for data analysis tasks.

Module	Title and Contents	Hrs
1	Program to Create and Manipulate Vectors Using R	30
2	Program to Implement Arithmetic Operators Using R	
3	Program to Implement Relational and Logical Operators Using R	
4	Program to Create and Customize Bar Plots Using R	
5	Program to Create Histograms Using R	
6	Program to Create an Ogive Curve Using R	
7	Program to Create Frequency Polygons Using R	
8	Program to Create Pie Charts Using R	
9	Program to Create and Perform Operations on Matrices Using R	
10	Program to Create and Manipulate Arrays Using R	
11	Program to Create and Manipulate Lists Using R	
12	Program to Create and Manipulate Data Frames Using R	
13	Program to Read and Analyze CSV Files Using R	
14	Program to Import and Process Excel Data Using R	
15	Program to Create and Manipulate Vectors Using R	
16	Program to Create and Use User-Defined Functions in R	
17	Program to Implement if and if-else Statements Using R	
18	Program to Implement else-if and Nested Conditional Statements Using R	
19	Program to Implement for and while Loops Using R	
20	Program to Implement repeat Loop and Loop Control Statements Using R	

Reference Books:-

1. Wickham, Hadley, and Garrett Golemund. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data. Sebastopol, CA: O'Reilly Media, 2016.
2. Wickham, Hadley. Advanced R. 2nd ed. Boca Raton, FL: CRC Press, 2017.
3. Wickham, Hadley. ggplot2: Elegant Graphics for Data Analysis. 2nd ed. Cham: Springer, 2017.

4. Grolemond, Garrett. Hands-On Programming with R: Write Your Own Functions and Simulations. Sebastopol, CA: O'Reilly Media, 2017.
5. Kabacoff, Robert I. R in Action. 3rd ed. Shelter Island, NY: Manning Publications 2022.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks)

- Journal: 10 Marks
- Student Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks)

- Section I: Attempt any (TWO) questions (10 Marks each)
- Attempt any (TWO) questions (05 Marks each)

