B.L.D.E.A's V.P.Dr.P.G.HALAKATTI COLLEGE OF ENGINERING AND TECHNOLOGY VIJYAPUR 586103

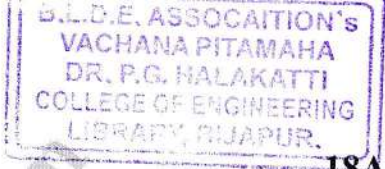## INDEX FILE QUESTION PAPERS JUN/JUL 2023

AIML DEPARTMENT

CBCS SCHEME

USN | | | | | | | | | |

18AI55

Fifth Semester B.E. Degree Examination, June/July 2023
Principles of Artificial Intelligence

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1	a.	Explain brief history of artificial intelligence.	(10 Marks)
	b.	Explain Intelligent systems in AI.	(10 Marks)

OR

2	a.	Explain current trends and development of AI.	(10 Marks)
	b.	Describe water Jug problem with production rules and give solution.	(10 Marks)

Module-2

3	a.	Explain two player perfect information games.	(10 Marks)
	b.	Explain alphabeta pruning with example.	(10 Marks)

OR

4	a.	Explain Iterative deepeing.	(05 Marks)
	b.	Write the algorithm for MINIMAX.	(10 Marks)
	c.	List the properties of α - β pruning.	(05 Marks)

Module-3

5	a.	Write the algorithm for conversion to clause form with example.	(10 Marks)
	b.	Write the propositional resolution algorithm with example.	(10 Marks)

OR

6	a.	Write the resolution algorithm for predicate logic with example.	(10 Marks)
	b.	Explain semantic tableau system.	(10 Marks)

Module-4

7	a.	Explain non linear planning strategies.	(10 Marks)
	b.	Explain block world problem.	(10 Marks)

OR

8	a.	Explain the types of planning system.	(10 Marks)
	b.	Explain means end analysis with example.	(10 Marks)

Module-5

9	a.	Explain the property inheritance algorithm.	(08 Marks)
	b.	Explain simple relation knowledge and procedural knowledge using example.	(12 Marks)

OR

10	a.	Explain 4 approaches to knowledge representation.	(12 Marks)
	b.	Explain expert systems.	(08 Marks)

* * * * *

2

18AI56

USN | | | | | | | | | | |

Fifth Semester B.E. Degree Examination, June/July 2023
Mathematics for Machine Learning

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   Define the linear dependent and linear independent of the vector space V(F). Also show that the set of vectors (1 0 1), (1 1 0) (-1, 0, -1) is linearly dependent in V_3(IR).   **(06 Marks)**

    b.   Solve the system of equations and also show that the solution is unique.
$$x_1 + x_2 + x_3 = 3$$
$$x_1 - x_2 + 2x_3 = 2$$
$$2x_1 + 3x_3 = 1.$$
                                                        (06 Marks)

    c.   For the matrix $A = \begin{bmatrix} 1 & -1 & 2 \\ 3 & 1 & 0 \end{bmatrix}$. Determine the linear transformation

      $T : V_3(IR) \to V_2(IR)$ relative to the basis B_1 and B_2 of V_3(IR) are V_2(IR).
      i) $B_1 = \{(1\ 1\ 1)\ (1\ 2\ 3)\ (1\ 0\ 0)\}$
      ii) $B_2 = \{(1, 1)\ (1, -1)\}$ **(08 Marks)**

OR

2   a.   Define:
      i)   An inner product space
      ii)   Projection of two vectors u and v
      iii)   Orthogonal vectors
      iv)   An orthogonal set.   **(08 Marks)**

    b.   Solve by using the Gaussian elimination method
$$2x_1 + x_2 + 4x_3 = 12$$
$$4x_1 + 11x_2 - x_3 = 33$$
$$8x_1 - 3x_2 + 2x_3 = 20$$
                                                     (06 Marks)

    c.   Obtain the matrix of linear transformation $T : V_2(IR) \to V_3(IR)$, defined by $T(x, y) = (x + y, x, 3x - y)$ with respect to the basis B_1 and B_2 where $B_1 = \{(1, 1), (3, 1)\}$ and $B_2 = \{(1, 1, 1), (1, 1, 0), (1, 0, 0)\}$.   **(06 Marks)**

Module-2

3   a.   Show that the given vector form an orthogonal basis for R^3 also express $\vec{0}$ as a linear

      combination of the basis vector, write the coordinate vector $[W]_B$ of $\vec{W}$ with respect to the

      basis $B = \{\vec{V}_1, \vec{V}_2, \vec{V}_3\}$ of R^3 where $V_1 = \begin{bmatrix} -1 \\ 0 \\ -1 \end{bmatrix}$ $V_2 = \begin{bmatrix} 3 \\ 6 \\ 3 \end{bmatrix}$ $V_3 = \begin{bmatrix} 3 \\ -3 \\ 3 \end{bmatrix}$ $W = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$.

                                                                      (08 Marks)

b. Reduce the matrix to diagonal form

$$A = \begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$$

(06 Marks)

c. If $v = \begin{bmatrix} 7 \\ 6 \end{bmatrix}$ and $u = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$ then find the orthogonal projection of v on to u and the orthogonal set.

(06 Marks)

OR

4 a. Find the singular value decomposition [SVD] of the matrix $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$. (10 Marks)

b. Show that the Eigen values of the following matrix are all equal, and also find the corresponding eigen vector.

$$A = \begin{bmatrix} -3 & -7 & -5 \\ 2 & 4 & 3 \\ 1 & 2 & 2 \end{bmatrix}$$

(10 Marks)

Module-3

5 a. A particle moves along the curve $\vec{r} = t^2 \hat{i} - t^3 \hat{j} + t^4 \hat{k}$, where 't' is the time. Find the magnitude of tangential component of its acceleration t = 1. (06 Marks)

b. If $U = x + y + z$, $V = x^2 + y^2 + z^2$, $W = xy + yz + zx$, then prove that grad u, grad v, grad w are coplanar. (06 Marks)

c. If $f(x) = \sqrt{x^2 + \exp(x^2)} + \cos(x^2 + \exp(x^2))$ find $\dfrac{df}{dx}$. Using the following computation graph and the intermediate variables a, b, c, d where $a = x^2$, $b = \exp a$, $c = a + b$, $d = \sqrt{c}$, $e = \cos c$, $f = d + e$.
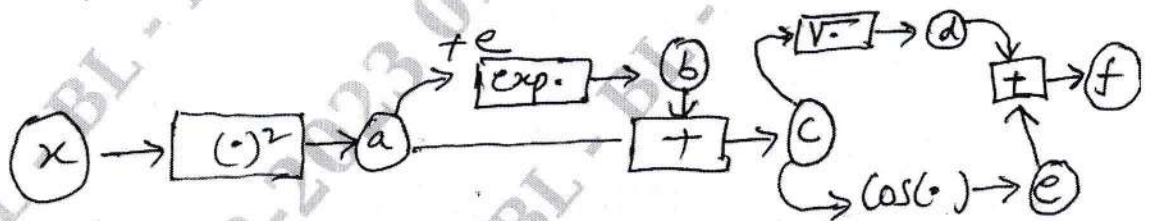

Fig.Q.5(c)

(08 Marks)

OR

6 a. If the directional derivative of $\phi = axy^2 + byz + cz^2x^3$ at (-1, 1, 2) has a maximum magnitude of 32 units in the direction of parallel to y-axis find a, b, c. (08 Marks)

b. Define gradient of a vector valued function consider the function h : R → R h(t) = (fog)t f : R^2 → R and g : R → R^2, if $f(x) = \exp(x_1 \ x_2^2)$ $x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = g(t) = \begin{bmatrix} t\cos t \\ t\sin t \end{bmatrix}$ then compute gradient of h with respect to t.

(12 Marks)

4

18AI56

Module-4

7 a. State and prove Baye's theorem on conditional probability. **(08 Marks)**

 b. Let A and B be two events, which are not mutually exclusive and are connected with random experiment. Given that $P(A) = 3/4$ $P(B) = 1/5$ $P(A \cap B) = 1/20$ then find: i) $P(A \cup B)$ ii) $P(A \cap \overline{B})$ iii) $P(\overline{A} \cap B)$ iv) $P(A/B)$ and $P(B/A)$. **(06 Marks)**

 c. A random variable x has the following probability distribution:

x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2 + K$

Find : i) Value of K   ii) $P(x < 6)$ iii) $P(x \geq 6)$. **(06 Marks)**

OR

8 a. Test whether the following function is a density function $f(x) = \begin{cases} e^{-x}, & x \geq 0 \\ 0, & x < 0 \end{cases}$ if so determine

 the probability that the variate having its density function will fall in the interval $(1, 2)$. **(08 Marks)**

 b. The length of the telephone conversation in a booth has been an exponential distribution and found on an average to be 5 minutes. Find the probability that a random call made from this booth i) Ends in less than 5 minutes   ii) Between 5 and 10 minutes. **(06 Marks)**

 c. Define binomial distribution and find the binomial probability distribution which has mean 2 and variance 4/3. **(06 Marks)**

Module-5

9 a. By using gradient descent method (steepest method) for $f(x_1 \; x_2) = x_1 - x_2 + 2x_1^2 + 2x_1 x_2$ has the optimal solution starting from the point $(0, 0)$ carry out four iterations. **(12 Marks)**

 b. Use Lagrange's multiplier, find the dimension of the rectangular box, which is open at the top of maximum capacity whose volume is 32 cubic feet. **(08 Marks)**

OR

10 a. Given that $x + y + z = a$ where 'a' is a constant, find the extreme value of the function $f(x, y, z) = x^m y^n z^p$. **(08 Marks)**

 b. Define a convex and a concave function, test the nature of definiteness by checking its extreme values for the function
 $f(x_1 \; x_2) = x_1^3 + x_2^3 + 2_1^2 + 4x_2^2 + 6$. **(06 Marks)**

 c. Determine whether the function $f(x) = x \log_2 x$ is convex or not for $x > 0$. **(06 Marks)**

* * * * *

5

CBCS SCHEME

18AI61

USN ☐☐☐☐☐☐☐☐☐☐

Sixth Semester B.E. Degree Examination, June/July 2023
Machine Learning

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. List and explain the steps to design a learning system in detail.   **(08 Marks)**
   b. List and explain the main types of Machine Learning.   **(04 Marks)**
   c. Consider the Enjoysport concept and instance given below. Identify the general and specific hypotheses using Candidate Elimination Learning Algorithm.

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(08 Marks)

OR

2 a. Explain the different Challenges of Machine Learning.   **(10 Marks)**
   b. Consider the "Japanese Economy Car" concept and instance given below, identify the hypotheses using Candidate Elimination Learning algorithm.

Origin	Manufacturer	Color	Decade	Type	Target Value
Japan	Honda	Blue	1980	Economy	Positive
Japan	Toyota	Green	1970	Sports	Negative
Japan	Toyota	Blue	1990	Economy	Positive
USA	Chryler	Red	1980	Economy	Negative
Japan	Honda	White	1980	Economy	Positive

(10 Marks)

Module-2

3 a. Explain the different steps to get the data.   **(10 Marks)**
   b. In context to prepare the data for Machine Learning Algorithm, write a note on :
      i)   Data Cleaning.
      ii) Handling text and Categorical attributes.
      iii) Feature Scaling.   **(10 Marks)**

OR

4 a. Using Code Snippets, outline the concepts involved in :
      i)   Measuring accuracy using cross validation.
      ii) Confusion Matrix.
      iii) Precision and Recall.   **(10 Marks)**
   b. Explain i) Multiclass Classification   ii) Multi Label Classification.   **(10 Marks)**

Module-3

5 a. Explain Batch Gradient Descent.   **(08 Marks)**
   b. Explain the different Regularized Linear Models.   **(12 Marks)**

6

OR

6 a. Explain how SVM's make predictions and how their training algorithm works. (12 Marks)
   b. Explain Logistic Regression. (08 Marks)

Module-4

7 a. Explain the concept of :
      i) Bagging and Pasting   ii) Voting Classifiers. (10 Marks)
   b. Define Boosting. Explain the different variants of Boosting. (10 Marks)

OR

8 a. Write a note on :
      i) The CART Training Algorithm   ii) Entropy. (10 Marks)
   b. Explain i) Out of Bag Evolution   ii) Random Forests. (10 Marks)

Module-5

9 a. Explain Naïve Bayes Classifier with example. (10 Marks)
   b. Describe the concept of MDL. Obtain the equation of h_{MDL}. (10 Marks)

OR

10 a. Derive the EM Algorithm in detail. (10 Marks)
   b. Explain Bayesian Belief Network with example. (10 Marks)
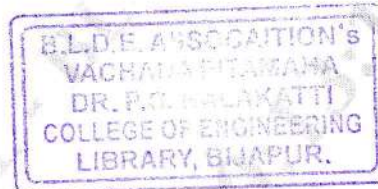
* * * * *

CBCS SCHEME

18AI62

USN ☐☐☐☐☐☐☐☐☐☐

Sixth Semester B.E. Degree Examination, June/July 2023
Digital Image Processing

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is digital image processing? Explain the fundamental steps of image processing with block diagram. **(08 Marks)**
   b. With diagram explain image formation in an eye. **(06 Marks)**
   c. Explain the following with respect to relationship between pixels i) Adjacency ii) Distance. **(06 Marks)**

OR

2 a. Explain the process of image sampling and quantization. **(10 Marks)**
   b. Explain the following:
       i)   Image acquisition using single sensor
       ii) Image acquisition using sensor array. **(10 Marks)**

Module-2

3 a. Explain different types of piecewise linear transformations. **(08 Marks)**
   b. Explain order statistics filters and smoothing linear filters. **(08 Marks)**
   c. Write a note on selective filtering. **(04 Marks)**

OR

4 a. What is Histogram processing? Explain Histogram equalization technique. **(08 Marks)**
   b. Explain different image sharpening methods for filtering in frequency domain. **(12 Marks)**

Module-3

5 a. Explain different noise probability density functions. **(10 Marks)**
   b. Explain adaptive median filter algorithm used for noise removal. **(10 Marks)**

OR

6 a. Explain the estimation of degradation function using i) Observation ii) Mathematical modeling. **(10 Marks)**
   b. Write a note on:
       i)   Inverse filtering
       ii) Wiener filtering. **(10 Marks)**

Module-4

7 a. Explain the opening and closing in morphological image processing. **(10 Marks)**
   b. Explain RGB and CMYK colour model. **(10 Marks)**

8

OR

8 a. Explain the procedure for converting RGB to HSI colour model and vice-versa. **(08 Marks)**
   b. Write a note on:
   i) Intensity slicing
   ii) Hit or miss transformation.

(12 Marks)

Module-5

9 a. Explain the following image segmentation techniques:
   i) Line detection
   ii) Edge detection.
   b. Explain any two types of region descriptors.

(10 Marks)
(10 Marks)

OR

10 a. Explain region splitting and merging.
    b. Explain any three types of boundary descriptors.

(08 Marks)
(12 Marks)

18AI63

Sixth Semester B.E. Degree Examination, June/July 2023
JAVA for Mobile Application

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain Java enumerations and write a code to demonstrate how varieties of apple can be represented through enumerations. **(08 Marks)**

   b. Explain following methods with suitable code snippet: (i) Values (ii) ValueOf **(04 Marks)**

   c. Explain type wrappers along with its importance and write a Java program to demonstrate how to use a numeric type wrapper to encapsulate a value and then extract that value. **(08 Marks)**

OR

2 a. Write a Java code that uses reflection to display the annotation associated with a method. Illustrate all methods used in the program. **(10 Marks)**

   b. Write a Java code to demonstrate auto boxing/unboxing occurs in expressions. **(10 Marks)**

Module-2

3 a. Explain the following collection classes with suitable code snippet:
   (i) The ArrayList Class   (ii) The LinkedList Class **(10 Marks)**

   b. Explain the collection framework core interfaces. Describe any two methods associated with Collection Interface. **(10 Marks)**

OR

4 a. Explain below listed methods with respect to algorithm defined inside collection framework
   (i) reverseOrder (ii) Shuffle **(10 Marks)**

   b. Write a Java code to demonstrate custom comparator, which implements the compare( ) method for string that operates in reverse of normal. **(10 Marks)**

Module-3

5 a. Explain the two string methods that returns the first occurance of a character and last occurance of a character. Illustrate same with suitable Java code. **(10 Marks)**

   b. Illustrate how to modify a string using a following methods:
   (i) substring( )   (ii) concat( )   (iii) replace( )   (iv) trim( ) **(10 Marks)**

OR

6 a. With relevant example, explain the following String Buffer methods:
   (i) ensureCapacity( )   (ii) setLength( )   (iii) append( )   (iv) insert( ) **(10 Marks)**

   b. Demonstrate how following methods can be used in character extraction:
   (i) charAt( ) (ii) getChars( ) (iii) getBytes( ) (iv) toCharArray( ) **(10 Marks)**

Module-4

7 a. With a neat block diagram, explain the architecture of android. **(10 Marks)**

   b. With suitable code snippet, explain linking activities using intents. **(10 Marks)**

10

OR

8 a. What is an activity? With a neat diagram, explain the Activity Life Cycle. Describe all the events associated. **(10 Marks)**

   b. Summarize the states, a fragments goes through after its creation. List the different methods that are called when fragment transists from one state to another. **(10 Marks)**

Module-5

9 a. Describe the following layout available in android: (i) Linear layout   (ii) Relative layout **(10 Marks)**

   b. Describe progress bar view with suitable code snippet. **(10 Marks)**

OR

10 a. Write a code to build mobile application to retrieve contacts from database. **(10 Marks)**

    b. Write a Java code to build a Quiz Application by using Radio Group Class. Consider a suitable view for designing the front end. **(10 Marks)**

* * * * *

11
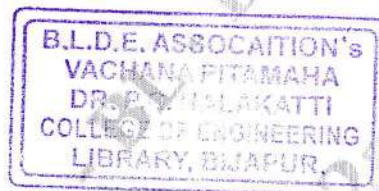
USN | | | | | | | | | | 18AI643

Sixth Semester B.E. Degree Examination, June/July 2023
Web Programming

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1　a. Describe the cascade principles used by CSS to deal with conflicts. **(10 Marks)**
　　b. Discuss the three main aims to HTML5 and explain the elements and attributes of HTML. **(06 Marks)**
　　c. Explain Ordered and Unordered list with examples. **(04 Marks)**

OR

2　a. With a neat diagram, briefly explain the concepts of box model. **(10 Marks)**
　　b. Define CSS. List and explain the benefits of CSS. **(06 Marks)**
　　c. List and explain the advantages of Semantic HTML Markup. **(04 Marks)**

Module-2

3　a. List the key advantages and disadvantages of GET and POST methods. Explain different form related HTML elements. **(08 Marks)**
　　b. Explain liquid layout design for website with an example. List the advantages and disadvantages of fluid layout. **(08 Marks)**
　　c. Explain how User's form input works. **(04 Marks)**

OR

4　a. Explain positioning elements in CSS. **(08 Marks)**
　　b. Illustrate the process of microformats with an example. **(08 Marks)**
　　c. Define responsive design. List four key components of responsive design. **(04 Marks)**

Module-3

5　a. Explain different server side technologies for creating web applications. **(10 Marks)**
　　b. Explain JavaScript layers with neat diagram. **(10 Marks)**

OR

6　a. With suitable diagrams, explain PHP module in apache. Describe the role of apache threads in web application execution. **(10 Marks)**
　　b. Briefly describe the document object model. **(10 Marks)**

Module-4

7　a. What are superglobal variables in PHP? Explain the $_GET and $_POST superglobal variables with examples. **(10 Marks)**
　　b. Explain the concept of Inheritance in PHP. Draw an UML class diagram showing inheritance. **(10 Marks)**

OR

8　a. Explain with examples, the process of opening, reading and writing text files in PHP. **(10 Marks)**
　　b. Explain classes and objects in PHP with an example. **(10 Marks)**

Module-5

9　a. Define Cookies. Explain the working of Cookies. **(10 Marks)**
　　b. What is AJAX? Explain AJAX request by writing UML diagram. **(10 Marks)**

OR

10　a. Define jQuery. Explain jQuery selectors with the suitable example. **(10 Marks)**
　　b. What is Caching? Explain two strategies used for Caching web applications. **(10 Marks)**

* * * * *

12