

# GBCS SCHEME

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18CS71

## Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Artificial Intelligence and 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. The water jug problem states : You are provided with two jugs, one with 4 gallons of capacity and the other one with 3 gallons of capacity. Neither have any measuring markers on it. How can we get exactly two gallons of water in 4 gallon jug?  
(i) Write down the production rules for the above problem.  
(ii) Write any one solution for the above problem. (08 Marks)
- b. Explain Steepest Ascent Hill Climbing technique with an algorithm. Comment on its drawbacks and how to overcome these drawbacks. (12 Marks)

OR

- 2 a. Explain problem reduction with respect to AND-OR graph with suitable example. (07 Marks)  
b. Write AO\* algorithm. (07 Marks)  
c. Discuss about constraint satisfaction and solve the below crypt arithmetic problem. (06 Marks)

$$\text{CROSS} + \text{ROADS} = \text{DANGER}$$

### Module-2

- 3 Consider the following sentences :
- John likes all kinds of food
  - Apples are food
  - Chicken is food
  - Anything anyone eats and isn't killed is food
  - Bill eats peanuts and is still alive
  - Sue eats every everything Bill eats.
- (i) Translate these sentences into formulas in predicate logic. (05 Marks)  
(ii) Prove that John likes peanuts using backward chaining. (05 Marks)  
(iii) Convert the formulas of (i) into clause form. (05 Marks)  
(iv) Prove John likes peanuts using resolution. (05 Marks)

OR

- 4 a. Distinguish forward and backward reasoning with an example. (04 Marks)  
b. Find maximally specific hypothesis for the training instances given below. Also write Find-S algorithm. The concept of this particular problem will be on what days does a person lines to go on walk.

Time	Weather	Temperature	Company	Humidity	Wind	Goes
Morning	Sunny	Warm	Yes	Mild	Strong	Yes
Evening	Rainy	Cold	No	Mild	Normal	No
Morning	Sunny	Moderate	Yes	Normal	Normal	Yes
Evening	Sunny	Cold	Yes	High	Strong	Yes

(08 Marks)

- c. Define version space. Discuss the limitations of finds algorithm over candidate elimination algorithm. (08 Marks)

**Module-3**

- 5 a. Explain the concept of decision tree learning. Write about attribute selection measure used to build the decision tree using ID3 algorithm. (07 Marks)
- b. How a single perceptron can be used to represent the Boolean functions such as AND, OR. (06 Marks)
- c. Write Gradient Descent algorithm to train a linear unit along with the derivation. (07 Marks)

**OR**

- 6 a. What do you mean by Gain and entropy? How it is used to build the decision tree. (08 Marks)
- b. Explain back propagation algorithm. Why is it not likely to be trapped in local minima? (08 Marks)
- c. Discuss the perceptron training rule and delta rule that solves the learning problem of perceptron. (04 Marks)

**Module-4**

- 7 a. Explain Naïve Bayes classifier. (08 Marks)
- b. Explain Bayesian Belief network and conditional independence with example. (08 Marks)
- c. Let us assume dangerous fires are rare (1%) but smoke is fairly common (10%) due to barbecues, and 90% of dangerous fires make smokes. Find the probability of dangerous fire when there is smoke. (04 Marks)

**OR**

- 8 a. Discuss minimum description length principle in brief. (08 Marks)
- b. Explain brute force MAP learning algorithm. (08 Marks)
- c. Explain EM algorithm. (04 Marks)

**Module-5**

- 9 a. Explain k-Nearest neighbor learning algorithm. (08 Marks)
- b. Explain Locally weighted regression. (08 Marks)
- c. What is reinforcement learning? (04 Marks)

**OR**

- 10 a. Distinguish Eager learning vs Lazy learning algorithms. (04 Marks)
- b. Write short notes on Q-learning. (08 Marks)
- c. Discuss about Radial basis function in detail. (08 Marks)

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## Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Big data Analytics

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define Big data. Explain the classification of Big data. (10 Marks)  
b. Define Scalability and its types along with examples. (10 Marks)

OR

- 2 a. Explain the functions of each layer in Big data architecture design with a diagram. (10 Marks)  
b. Define data preprocessing. Explain in brief the needs of preprocessing. (10 Marks)

### Module-2

- 3 a. What is HDFS? Highlight the important design features of the HDFS. (10 Marks)  
b. Bring out the concepts of the HDFS block replication with an example. (10 Marks)

OR

- 4 a. Explain Apache sqoop import and export method with neat diagram. (10 Marks)  
b. Demonstrate any six HBase commands with output. (10 Marks)

### Module-3

- 5 a. Explain about NOSQL data store and its characteristics. (10 Marks)  
b. Describe the principle of working of the CAP theorem. (10 Marks)

OR

- 6 a. Demonstrate the working of key-value store with an example. (10 Marks)  
b. Describe the features of MangoDB, and its industrial application. (10 Marks)

### Module-4

- 7 a. Describe the Map tasks, Reduce tasks and Map Reduce Execution process. (10 Marks)  
b. Describe the Hive architecture and its characteristics. (10 Marks)

OR

- 8 a. Demonstrate the pig architecture for scripts data flow and processing. (10 Marks)  
b. Differentiate between Pig and Map Reduce, give industrial applications for each. (10 Marks)

### Module-5

- 9 a. Explain the simple linear regression analysis. (10 Marks)  
b. Demonstrate frequent item set mining and association rule mining. (10 Marks)

OR

- 10 a. With a neat diagram, write the steps in K-means clustering. (10 Marks)  
b. Explain the purpose of web usage analytics and the significance of web graphs. (10 Marks)

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18CS733

## Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Advanced Computer Architecture

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Explain Flynn's classification of computer architecture. (08 Marks)
- b. Determine the parallel pairs using Bernstein's condition and dependency graph
- P1 : C = D × E
- P2 : M = G + C
- P3 : A = B + C
- P4 : C = L + M
- P5 : F = G % E
- (08 Marks)
- c. Define Amdahl's Law. (04 Marks)

OR

- 2 a. Explain 5 types of data dependencies with example.
- b. A 1 GHz processor is used to execute benchmark program with the following instruction count. Calculate CPI MIPS rate and execution time. (10 Marks)

Instruction Type	Instruction count	Clock Cycle Count
Integer Arithmetic	450000	1
Data Transfer	320000	2
Floating Point	150000	2
Control Transfer	80000	2

(10 Marks)

### Module-2

- 3 a. Differentiate the characteristics of CISC and RISC architecture. (06 Marks)
- b. Explain the Architecture of VLIW processor and its pipeline operations. (08 Marks)
- c. Explain Address translation mechanism using TLB and page table. (06 Marks)

OR

- 4 a. With the help of neat Diagram, explain super scalar RISC processor architecture. (08 Marks)
- b. Explain two virtual memory models for multiprocessor systems. (08 Marks)
- c. Mention different Page Placement Policy. (04 Marks)

### Module-3

- 5 a. What is arbitration? Explain different types of arbitration. (10 Marks)
- b. For the reservation table of a non linear pipeline shown below :

	1	2	3	4	5	6
S1	X					X
S2		X			X	
S3			X			
S4				X		
S5		X				X

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- i) What are the forbidden latencies? Write initial collision vector.
- ii) Draw the state transition diagram
- iii) List all simple cycles and greedy cycles
- iv) Determine MAL.

(10 Marks)

**OR**

- 6 a. With the help of diagram, explain Back Plane Bus Specification. (04Marks)
- b. Explain the following with diagram
- i) Direct mapping
  - ii) Fully associative cache
  - iii) Set Associative cache. (08 Marks)
- c. Differentiate between low order memory interleaving and high order memory interleaving. (08 Marks)

**Module-4**

- 7 a. With the help of diagram, explain routing in omega network. (04 Marks)
- b. Explain different type of vector instructions with examples. (08 Marks)
- c. Explain snoopy bus protocol in detail. (08 Marks)

**OR**

- 8 a. With the help of diagram, explain store and forward routing and wormhole routing. (06 Marks)
- b. Explain the cache coherence problem with respect to
- i) Sharing of writable data
  - ii) Process migration
  - iii) I/O activity (06 Marks)
- c. Explain Directory based cache coherence scheme. (08 Marks)

**Module-5**

- 9 a. Explain compilation phases in parallel code generation. (08 Marks)
- b. Mention 5 parallel programming models. Explain shared memory model in detail. (08 Marks)
- c. Explain Register Renaming with example. (04 Marks)

**OR**

- 10 a. Explain Tomasulo's algorithm in detail. (10 Marks)
- b. Discuss the following in Object Oriented Model.
- i) Concurrent OOP
  - ii) Actor Model
  - iii) Parallelism of COOP (10 Marks)

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1KSI8CS011

18CS734

## Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 User Interface Design

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define User Interface. Discuss the benefit of good design. (10 Marks)  
b. Discuss the characteristics of the Graphical User Interface. (10 Marks)

OR

- 2 a. Compare GUI versus Web Page Design with respect to Devices, Data, Presentation Elements, Navigation, User tasks. (10 Marks)  
b. Discuss the following general principles of user interface  
i) Aesthetically pleasing      ii) Compatibility      iii) Consistency  
iv) Control      v) Simplicity. (10 Marks)

### Module-2

- 3 a. List and explain common usability problems in graphical systems. (10 Marks)  
b. Discuss any five Human characteristics in interface design. (10 Marks)

OR

- 4 a. Explain Indirect methods of requirement determination in Business Function. (10 Marks)  
b. Discuss briefly the guidelines for designing conceptual models. (10 Marks)

### Module-3

- 5 a. List and explain different structures of Menu with suitable diagrams. (12 Marks)  
b. Discuss Functions and content of Menus. (08 Marks)

OR

- 6 a. Explain the purpose, advantages, disadvantages, guidelines to be followed in designing following menu choices. i) Mark Toggles ii) Toggled Menu Items. (08 Marks)  
b. Discuss in detail the following Graphical menus  
i) Pull – Down Menu      ii) Cascading Menus      iii) Popup Menus. (12 Marks)

### Module-4

- 7 a. List and discuss in different ways, windows are useful. (12 Marks)  
b. Explain filed windows, overlapping windows, and cascading windows their advantages and disadvantages. (08 Marks)

OR

- 8 a. Explain model and modeless and cascading and unfolding windows. (08 Marks)  
b. Explain the following with respect to windows  
i) frame      ii) Window sizing Buttons      iii) Scroll bars      iv) Split box. (08 Marks)  
c. Describe Joystick with advantages and disadvantages. (04 Marks)

### Module-5

- 9 a. Explain different command button guide lines. (12 Marks)  
b. Describe check boxes, list boxes, palettes with advantages and disadvantages. (08 Marks)

OR

- 10 a. List common presentation controls and discuss any four of them. (08 Marks)  
b. Explain the following kinds of tests  
i) Cognitive walk through      ii) Think-Aloud Evaluations      iii) Usability Test. (12 Marks)

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## Seventh Semester B.E. Degree Examination, Jan./Feb. 2023

### Cryptography

Time: 3 hrs.

Max. Marks: 100

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

#### Module-1

- 1 a. Explain Playfair Cipher Algorithm. Find the Ciphertext for plaintext = "instruments" with key = "MONARCHY". (10 Marks)
- b. Explain with neat diagram Feistel Cipher structure for Encryption and Decryption. (10 Marks)

OR

- 2 a. Explain Hill Cipher Algorithm. Using Hill-Cipher perform encryption and decryption for plaintext = "paymoremoney" using key  $K = \begin{bmatrix} 17 & 17 & 5 \\ 21 & 18 & 21 \\ 2 & 2 & 19 \end{bmatrix}$ . (10 Marks)
- b. Explain with neat diagram DES encryption algorithm. (10 Marks)

#### Module-2

- 3 a. Explain RSA algorithm. Using RSA algorithm perform encryption and decryption using  $p = 17, q = 11, e = 7$  and  $M = 88$ . (10 Marks)
- b. Explain Diffie-Hellman key exchange algorithm and also show that the calculations produce the identical results. (10 Marks)

OR

- 4 a. Explain Elgamal cryptosystem. Perform encryption and decryption using  $q = 19, \alpha = 10, k = 6, M = 17, X_A = 5$  and  $Y_A = 3$ . (10 Marks)
- b. Explain the requirements and applications for public key cryptography. (10 Marks)

#### Module-3

- 5 a. Explain the concept of PRNG based on RSA. (10 Marks)
- b. Explain the distribution of public keys with public key Authority. (10 Marks)

OR

- 6 a. Explain with neat diagram control vector encryption and decryption. (10 Marks)
- b. Explain distribution of public keys using public key certificates. (10 Marks)

#### Module-4

- 7 a. Explain X.509 certificate format. (10 Marks)
- b. Bring out the differences between Kerberos version 4 and version 5 and also mention the technical deficiencies in Kerberos version 4 protocols. (10 Marks)

OR

- 8 a. Explain PKIX architectural model. (10 Marks)
- b. Explain with neat diagram the key components of Internet Mail Architecture. (10 Marks)

#### Module-5

- 9 a. Explain the benefits and applications of IPsec. (10 Marks)
- b. Explain the IP traffic processing for outbound and inbound packets. (10 Marks)

OR

- 10 a. Explain ESP packet format. (10 Marks)
- b. Explain the concept of transport and tunnel modes. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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## Seventh Semester B.E. Degree Examination, Jan./Feb. 2023

### Python Application programming

Time: 3 hrs.

Max. Marks: 100

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

#### Module-1

- 1 a. Explain the rules of precedence used by python to evaluate an arithmetic expression. Also explain the arithmetic operators used in python. (07 Marks)
- b. With a neat diagram, explain computer hardware architecture. List and explain three types of errors encounter in python programs. (08 Marks)
- c. Write a user defined function named "Read\_age" that reads and returns age of a person. Call the function to read the age of Amar, Akbar and Antony. Print the youngest and Eldest age among three friends. (05 Marks)

#### OR

- 2 a. Explain if, if-else and elif statements in python. (06 Marks)
- b. Write a program to prompt a score between 0.0 and 1.0. If the score is out of range. Print an error. If the score is between 0.0 and 1.0, print a grade using the following table:

Score	Grade
$\geq 0.9$	A
$\geq 0.8$	B
$\geq 0.7$	C
$\geq 0.6$	D
$\geq 0.5$	E
$< 0.5$	F

- c. Define the following: (i) Functions (ii) Parameters and arguments  
(iii) Fruitful functions and void functions (07 Marks)  
Also write the reasons to divide the program into functions. (07 Marks)

#### Module-2

- 3 a. Explain while and for loop statements in python. Write a program to display First 'n' Natural numbers using while loop. (08 Marks)
- b. Write a python program to accept a filename from the uses :  
(i) Display the first N-lines of the file. (07 Marks)  
(ii) Find the frequency of occurrences of the word accepted from the user in the file. (05 Marks)
- c. Define string. Explain string slicing in python with examples. (05 Marks)

#### OR

- 4 a. Write a python program to accept a sentence from the user and display the longest and smallest word of that sentence along with its length. (07 Marks)
- b. Explain the following:  
(i) read ( ) (ii) string traversing (iii) open ( ) (iv) break keyword (08 Marks)
- c. Write a python program to print the sum of the following series :  $1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}$ . 'n' is read from the user. (05 Marks)



**Module-3**

- 5 a. Write a python program to read all the lines in a file accepted from the user and print all email addresses contained in it. Assume the email addresses contain only non\_ white space characters. (06 Marks)
- b. Explain how to traverse and slice a list with suitable example. Also explain how to delete elements from a list with different methods. (08 Marks)
- c. Write a program progress to accept a string from user and print the frequency of each character in the string. Use Dictionary. (06 Marks)

**OR**

- 6 a. Given three points as list of tuples i.e.,  $[(x_1, y_1), (x_2, y_2), (x_3, y_3)]$ , write a program to check if they are collinear. (06 Marks)
- b. Explain the following functions:  
 (i) append ( )                      (ii) extend ( )                      (iii) sort ( )                      (iv) keys ( ) and values ( ) (08 Marks)
- c. Write a python program that matches a string that has an 'a' followed by zero or more 'b's'. Use Regular Expressions search ( ) method. (06 Marks)

**Module-4**

- 7 a. Explain \_\_init\_\_ method with an example. (05 Marks)
- b. What is a pure function? Write a python program to find duration of event if start and end time is given by defining class TIME. (08 Marks)
- c. Explain operator overloading. How \_\_add\_\_ method is invoked when operator + used between the objects. Explain its working. (07 Marks)

**OR**

- 8 a. Create a Temperature class. Include two methods:  
 Method 1 : ConvertFahrenheit-takes Celsius and print in Fahrenheit  
 Method 2 : ConvertCelsius-takes Fahrenheit and print in Celsius  
 Derive the above methods through objects of temperature class. (07 Marks)
- b. Explain \_\_str\_\_ method with an example. (05 Marks)
- c. Define polymorphism. Write a class Rectangle that has attributes length and breadth and a method area which returns the area of the Rectangle. Also add a method move\_rectangle ( ) that takes an object of Rectangle class and two numbers named dx and dy. It should change the location of the rectangle by adding dx to the X coordinate of corner and adding dy to the y coordinate of corner. (08 Marks)

**Module-5**

- 9 a. What is socket? Explain how socket connection can be established to the internet using python code over the TCP IP connection and http protocol to get the web document. (08 Marks)
- b. Write a python code for creating employee database inserting records and selecting the employees working in the company. (08 Marks)
- c. Write a note on JSON. (04 Marks)

**OR**

- 10 a. Explain the significance of XML over the web development. Design a python program to retrieve a node present in XML tree. Illustrate with an example. (08 Marks)
- b. What is embedded SQL? Explain the importance of SQLite database. With suitable example, explain functions involved in creation of database table in python. (08 Marks)
- c. What is service oriented architecture? Discuss its benefits. (04 Marks)

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## Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Introduction to 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. Define the following terms
- i) Artificial Intelligence
  - ii) Agent
  - iii) Search space
  - iv) Logical Reasoning
  - v) Expert tasks. (10 Marks)
- b. What are AI problem characteristics? Explain each with an example. (10 Marks)

**OR**

- 2 a. Define production system. Discuss the different categories (characteristics) of production system. (10 Marks)
- b. There are 2 water Jugs of 3 and 4 litre. Neither has any measuring marker. There is a tap that can be used to fill the Jugs with water. Indicate how 4-litre Jug can be filled half. Solve this water – Jug problem by giving complete set of production rules and state space tree. (10 Marks)

### Module-2

- 3 a. Briefly explain the four approaches of knowledge representation with an example. (10 Marks)
- b. List the drawbacks of propositional logic. (04 Marks)
- c. Differentiate between procedural v/s declarative knowledge. (06 Marks)

**OR**

- 4 a. Define forward and backward reasoning formulate and show the complete steps of 8-puzzle for the following data:

Start State		
2	8	3
1	6	4
7		5

⇒

Goal State		
1	2	3
8		4
7	6	5

(10 Marks)

- b. Consider the following predicates:
- i) Man (Marcus)
  - ii) Pompeian (Marcus)
  - iii) Born (Marcus, 40)
  - iv)  $\forall x : \text{man}(x) \rightarrow \text{mortal}(x)$
  - v)  $\forall x : \text{pompeian}(x) \rightarrow \text{died}(x, 79)$
  - vi) erupted (Volcano, 79)
  - vii)  $\forall x : \forall t_1 : \forall t_2 : \text{mortal}(x) \wedge \text{born}(x_1 t_1) \wedge \text{gt}(t_2 - t_1, 150) \rightarrow \text{dead}(x, t_2)$
  - viii) now = 1991
  - ix)  $\forall x : \forall t : [\text{alive}(x, t) \rightarrow \sim \text{dead}(x_1 t)] \wedge [\sim \text{dead}(x_1 t) \rightarrow \text{alive}(x_1 t)]$
  - x)  $\forall x : \forall t_1 : \forall t_2 : \text{died}(x, t_1) \wedge \text{gt}(t_2, t_1) \rightarrow \text{dead}(x_1 t_2)$
- Prove that :  $\sim \text{alive}(\text{marcus}, \text{now})$ . (10 Marks)

**Module-3**

- 5 a. What is non monotonic reasoning? Explain the 2 approaches of default reasoning. (10 Marks)  
b. Discuss the importance of truth maintenance system and their types. (10 Marks)

**OR**

- 6 a. Explain Dempster-Shafer theory with example. (10 Marks)  
b. State and prove (Bayes) theorem for conditional probability. (10 Marks)

**Module-4**

- 7 a. Briefly explain the MINIMAX algorithm with example. (10 Marks)  
b. Explain iterative deepening. Write algorithms for depth first iterative deepening and iterative deepening A\*. (10 Marks)

**OR**

- 8 a. Explain the different steps in natural language understanding process. (10 Marks)  
b. List and explain the various spell checking techniques. (10 Marks)

**Module-5**

- 9 a. Define Learning. Explain rote learning with example. (10 Marks)  
b. Discuss the different learning techniques with respect to problem-solver. (10 Marks)

**OR**

- 10 a. You work for a software company. You receive an order to develop an expert system for movie feedback analysis. Iterate how you would efficiently design it. (10 Marks)  
b. Given a chatbot how would you acquire and accumulate knowledge needed for it to work seamlessly. (10 Marks)

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