JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-V Semester (CSE/IT/ECE/CE/BT/BI)

COURSE CODE (CREDITS): 20B1WCI531 (2)   MAX. MARKS: 25

COURSE NAME: Foundation for Data Science and visualization

COURSE INSTRUCTORS: Dr. Aman Sharma and Dr. Shubham Goel

MAX. TIME: 1 Hour 30 Minutes

Note: **(a)** *All questions are compulsory.* **(b)** *Marks are indicated against each question in square brackets.* **(c)***The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

Q1. Write the output of following Python code.   **[Marks 4]**

i)	ii)

a = True
b = False
c = False
 	
if not a or b:
    print (1)
elif not a or not b and c:
    print (2)
elif not a or b or not b and a:
    print (3)
else:
    print (4)
	def foo(x):
	    x = [4]
	    return id(x)
	
	a = [1, 2, 3]
	b = foo(a)
	
	print(b)
	print(id(a))

iii)	iv)

def multiply(a, b):
  if b == 0:
    return 0
  if b % 2 == 0:
    half = multiply(a, b // 2)
    return half + half
  else:
    return a + multiply(a, b - 1)
 	
result = multiply(7, 5)
print(result)
	def sequence(n):
	  if n <= 0:
	    return []
	  elif n == 1:
	    return [1]
	  else:
	    seq = sequence(n-1)
	    return seq + [n] + seq
	
	result = sequence(4)
	print(result)

Q2. Explain the advantages of using JSON as a data format for web applications. Provide examples of real-world use cases where JSON is commonly used.   **[Marks 3]**

Q3. You have a collection of text documents. Implement a text preprocessing pipeline that includes tokenization, stop word removal, and stemming or lemmatization. Apply this pipeline to the documents and explain how it improves text analysis. **[Marks 3]**

Q4. I roll two dice and observe two numbers X and Y. **a)** Find Range R_x, R_y and the PMFs of X and Y **b)** Find P(X=2, Y=6) **c)** Find P(X>3|Y=2) **d)** Let Z=X+Y. Find the range and PMF of Z **e)** Find P(X=4|Z=8). **[Marks 4]**

Q5. State and prove that variance is independent for change in origin but not Scale. **[Marks 3]**

Q6. A large chain retailer purchases a certain kind of electronic device from a manufacturer. The manufacturer indicates that the defective rate of the device is 3%. **[Marks 3]**
(a) The inspector randomly picks 20 items from a shipment. What is the probability that there will be at least one defective item among these 20?
(b) Suppose that the retailer receives 10 shipments in a month and the inspector randomly tests 20 devices per shipment. What is the probability that there will be exactly 3 shipments each containing at least one defective device among the 20 that are selected and tested from the shipment?

Q7. Goals scored by two teams A and B in a football season were as shown as following Find which team may be considered more consistent. **[Marks 3]**

No of goals scored in a match	0	1	2	3	4
No of matches team A	27	9	8	5	4
No of matches team B	17	9	6	5	3

Q8. Complete the filling the blanks. **[Marks 2]**
   a)   To read a CSV file into R, the function commonly used is _____.
   b)   In R, "CRAN" stands for Comprehensive R _____ Network.
   c)   To remove missing values (NA) from a vector in R, the function _____ is used.
   d)   The widely used R package for data visualization is _____.

*****************************Best of Luck***

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-I Semester (CSE/IT/ECE/CE/BT/BI)

COURSE CODE (CREDITS): 18B1WCI740 (3) MAX. MARKS: 25

COURSE NAME: Computational Techniques and Algorithms in Engineering

COURSE INSTRUCTORS: Dr. Rakesh Kanji MAX. TIME: 1 Hour 30 Minutes

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Note: (a) Answer any 5 questions

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for

solving problems

Q1.(i) Provide any example of bad system of equations. Name any algorithm for handling bad system. [1+1] [CO3,CO4]

(ii) How least square helps to solve bad system of equations? [1] [CO3]

(iii) How least square is related to solving system of equations by Gram Schmidt method?

[2] [CO3,CO4]

Q2. (i) Find out the condition on D and U for which P to be projection matrix.

Consider $P = UD\,U^T$. [2] [CO3]

(ii) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \end{bmatrix} X = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, Find out X vector via orthogonal projection method. [3] [CO3,CO4]

Q3. Find out the Gram Schmidt orthogonalization transformation for column and row of $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \end{bmatrix}$.

[2.5+2.5] [CO3,CO4]

Q4. (i) Provide the algorithm and complexity for Given Rotation of n cross m matrix with rank k.

[4] [CO3]

(ii) Is R a valid rotational matrix under orthonormal transformation?

$R = \begin{bmatrix} \cos\theta & 1 & -\sin\theta \\ 0 & 1 & 0 \\ \sin\theta & 0 & \cos\theta \end{bmatrix}$ [1] [CO3]

Q5. What is the difference between Psudoinverse and inverse? Compute the Psudoinverse for $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$. [1+4] [CO4]

Q6. Provide the strategy for finding outlier by Gram Schmidt. How orthonormal part (Q) of Gram Schmidt process could be justified as data visualization? [3+2] [CO3,CO4]

Q7. Please rotate $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ vector with 30 degree angle in every possible planes. Why one should prefer Given rotation to Gram Schmidt for solving system of equations. [4+1] [CO3,CO4]

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B. Tech-III Semester (CSE)

COURSE CODE(CREDITS): 18B11CI314 (3)   MAX. MARKS: 25

COURSE NAME: Python Programming Essentials

COURSE INSTRUCTORS: Dr. Naveen Jaglan, Dr. Emjee Puthooran, Dr. Nishant Jain, Mr.
Aayush Sharma   MAX. TIME: 1 Hour 30 Min

Note: (a) All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for

solving problems

1. Write a program to know the cursor position (file pointer) and print the text according to below-given specifications:
    (a) Print the initial position
    (b) Move the cursor to 4th position
    (c) Display next 5 character
    (d) Move the cursor to the next 10 characters
    (e) Print the current cursor position
    (f) Print next 10 characters from the current cursor position   [CO-4; 3 marks]

2. Write a Python program to remove all elements from a given list present in another list using lambda.
    Original lists: list1 [1, 2, 3, 4, 5, 6, 7, 8, 9, 10] list2: [2, 4, 6, 8]
    Remove all elements from list1 present in list2: [1, 3, 5, 7, 9, 10]   [CO-3; 2 marks]

3. With the help of a suitable program explain the Class methods, Static methods and Instance methods.   [CO-5; 4 marks]

4. Write a python program to count the number of lines, words and characters in a text file.
                    [CO-4; 3 marks]

5. With the help of a python program show that bisection search convergence is better than approximate solutions algorithm.   [CO-2; 4 marks]

6. Given a string as your input, delete any recurring character and return the new string.
    Sample Input: mississippi
    Sample Output: misp   [CO-1; 3 marks]

7. Find the outputs of following python programmes: [CO-5; 6 marks]

(a)

```
class Demo:
    def __init__(self):
        pass

    def test(self):
        print(__name__)

obj = Demo()
obj.test()
```

(b)

```
class stud:
    def __init__(self, roll_no, grade):
        self.roll_no = roll_no
        self.grade = grade
    def display (self):
        print("Roll no : ", self.roll_no, ", Grade: ", self.grade)
stud1 = stud(34, 'S')
stud1.age=7
print(hasattr(stud1, 'age'))
```

(c)

```
def add(c,k):
    c.test=c.test+1
    k=k+1
class A:
    def __init__(self):
        self.test = 0
def main():
    count=A()
    k=0

    for i in range(0,25):
        add(count,k)
    print("Count.test=", count.test)
    print("k =", k)
main()
```

(d)

```
>>> class demo():
        def __repr__(self):
            return '__repr__ built-in function called'
        def __str__(self):
            return '__str__ built-in function called'
>>> s=demo()
>>> print(s)
```

(e)

```
#mod1
def change(a):
    b=[x*2 for x in a]
    print(b)
#mod2
def change(a):
    b=[x*x for x in a]
    print(b)
from mod1 import change
from mod2 import change
#main
s=[1,2,3]
change(s)
```

(f)

```
from math import factorial
print(math.factorial(5))
```

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B. Tech-VI Semester (CSE/IT)

COURSE CODE(CREDITS):18B11CI514(3)   MAX. MARKS: 25

COURSE NAME: Computer Organization and Architecture

COURSE INSTRUCTORS: Dr. Naveen Jaglan, Dr. Harsh Sohal, Dr. Alok Kumar and Mr. Munish

Sood   MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for

solving problems

1. Show the step-by-step restoring division process for signed numbers when the following binary numbers are divided:

$(-18) \div (3)$

Assume 6-bit registers that hold the signed and unsigned numbers.

[CO-1; 4 marks]

2. Convert a number 85.125 into single precision IEEE 754 floating point standard. Explain underflow and overflow exceptions in floating point numbers.   [CO-2; 4 marks]

3. The access time of a cache memory is 100 ns and that of main memory 1000 ns. It is estimated that 80 percent of the memory requests are for read and the remaining 20 percent for write. The hit ratio for read accesses only is 0.9. A write through procedure is used.

(a) What is the average access time of the system considering only memory read cycles?
(b) What is the average access time of the system considering only memory write cycles?
(c) What is the average access time of the system for both read and write requests?
(d) What is the effective hit ratio taking into consideration the write cycles?

[CO-3; 4 marks]

4. Consider main memory has 3-page frames (0,1,2). Calculate Hits and Misses and suggest the best algorithm out of FIFO, LRU and OPT. Processor requires pages from virtual memory in the following sequence of page numbers: 4,7,3,0,1,7,3,8,5,4,5,3,4,7.

[CO-3; 4 marks]

5. Write one main difference between:

(a) RISC and CISC Processor
(b) Computer Organization and Computer Architecture
(c) Von Neumann and Harvard Architecture
(d) Direct and Indirect Addressing Modes
(e) Spatial Locality and Temporal Locality

[CO-2; 5 marks]

6. What are the advantages of set-associative cache mapping techniques over direct mapping techniques? Consider a computer system with main memory address of 36-Bits, Cache memory size of 256 KB and block size of 64 bytes. Calculate the number of Tag bits in direct mapping, 4-way set associative mapping and Fully-associative mapping.

[CO-3; 2+2 = 4 marks]

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-Vth Semester (IT)

COURSE CODE (CREDITS): 18B11CI512(3)   MAX. MARKS: 25

COURSE NAME: INFORMATION SYSTEMS

COURSE INSTRUCTORS: DR. RUCHI VERMA   MAX. TIME: 1 Hour 30 Minutes

Note: (a)All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for

solving problems

Q1. By crowd sourcing innovation with Planview IdeaPlace, Polaris aims to achieve 80% reduction in time needed to analyze, graduate, and implement new ideas and inventions, changing their R&D process and time to market dramatically, a distinct competitive advantage in a crowded vehicle market.

Design a crowd sourcing campaign for the Polaris to achieve the above mentioned objectives.

(5 marks CO- 3)

Q2. Digital transformation is a central element of Benin's public sector structural reforms. However, pitfalls can be encountered with digital deployment if sufficient attention is not paid to digital governance issues. The Government of Benin turned to Estonia to learn from this small country's experience of becoming a world leader in e-government.

Design a strategy for implementing the e-governance model for Benin through the following steps: (8 marks   CO-2)

a) Defining the goals and objectives of e-government architecture

b) Design of the e-government architecture

c) Steps in implementation of e governance

d) Classification of the e government

Q3. Discuss in detail the separation of digital natives versus digital immigrants. (3 marks CO-3)

Q4. What are the various forms of participatory culture? Illustrate the functioning of each form with an example. (3 marks CO-2)

Q5. Design the user interface for the Nature Encyclopedia App as per the undermentioned design principles: (6 marks CO-4)

a) The basic fundamental principles for user centered design.
b) Transition from Analysis to User-Interface Design
c) Designing Reports, Statements and Turnaround Documents
d) Internationalization of the user interface design

COURSE CODE (CREDITS): 22M1WCI132 (3) MAX. MARKS: 25

COURSE NAME: Artificial Intelligence Techniques

COURSE INSTRUCTORS: Dr. Nancy Singla MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory.
(b) Marks are indicated against each question in square brackets.
(c) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems

Q1. Consider a genetic algorithm in which individuals are represented using a 5-bit string of the form b1b2b3b4b5. An example of an individual is 001001 for which b1=0, b2=0, b3=1, b4=0, b5=1. [2+2+2] CO1

The fitness function is defined over these individuals as follows:
f(b1b2b3b4b5) = b1 + b2 + b3 + b4 + b5 + AND(b1,b2,b3,b4,b5)

(a) Calculate the fitness and probability of selection of the following individuals in the population.
00101, 11101, 00000, 10010, 11111

(b) Suppose that a single crossover point will be used for crossover. This point has been chosen as the point between the 2nd and the 3rd bits (i.e. between b2 and b3). Show the two offspring that will result from crossing over the following two individuals:
00101, 10111

(c) Explain how the standard mutation method is applied after selection and crossover to form the "next" generation of a population.

Q2. (a) Describe simulated annealing search algorithm. [2+2]
(b) How would simulated annealing work if the temperature T is always fixed at zero? CO1

Q3. Consider the following hypothetical game tree (the values at the leaves are values of the evaluation function reflecting the promise of the nodes): [3+3] CO1
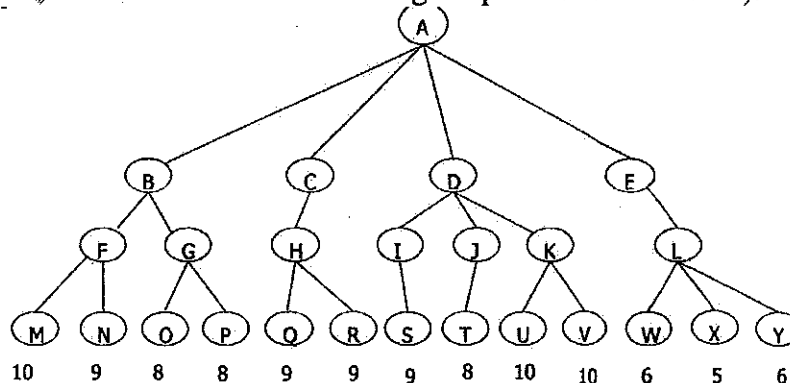
(a) Using minimax technique, obtain the value at the root and show which move player A should make.

(b) Apply Alpha-Beta pruning from left to right and show which parts of the tree need not be generated.

Q4. (a) How can randomness be incorporated into a game tree? **[2+2]**

(b) Consider a game with eight cards ($c \in \{1, 2, 3, 4, 5, 6, 7, 8\}$), sorted onto **CO1** the table in four stacks of two cards each. MAX and MIN each know the contents of each stack, but they do not know which card is on top. The game proceeds as follows. First, MAX chooses either the left or the right pair of stacks. Second, MIN chooses either the left or the right stack, within the pair that MAX chose. Finally, the top card is revealed. MAX receives the face value of the card (c), and MIN receives $9 - c$. The resulting expectiminimax tree is as follows:
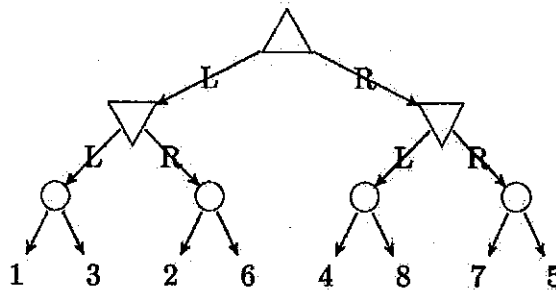
Assume that the two cards in each stack are equally likely. What is the value of the top MAX node?

Q5. (a) Write a function for a generic knowledge-based agent that returns an action **[3+2]** for a given percept. **CO3**

(b) What are the steps followed in the forward chaining mode of the inference engine used in an intelligent system?

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-I Semester (CSE/IT)

COURSE CODE (CREDITS):18B1WCI742 (2)   MAX. MARKS: 25

COURSE NAME: Artificial Intelligence

COURSE INSTRUCTORS: Dr. Nancy Singla, Dr. Diksha Hooda   MAX. TIME: 1 Hr 30 Min

Note: (a) All questions are compulsory.
(b) Marks are indicated against each question in square brackets.
(c) The candidate is allowed to make suitable numeric assumptions wherever required for solving
problems

Q1. Suppose a genetic algorithm uses chromosomes of the form x = abcdefgh with a fixed   [2+2]
length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of   CO1
individual x be calculated as: $f(x) = (a + b) - (c + d) + (e + f) - (g + h)$ and let the
initial population consist of four individuals with the following chromosomes:
x1 = 6 5 4 1 3 5 3 2
x2 = 8 7 1 2 6 6 0 1
x3 = 2 3 9 2 1 2 8 5
x4 = 4 1 8 5 2 0 9 4
(a) Evaluate the fitness of each individual, showing all your workings, and arrange
them in order with the fittest first and the least fit last.
(b) What is the significance of crossover operator in the genetic algorithms? Perform
the crossover operation on the fittest two individuals using one-point crossover at
the middle point.

Q2. (a) Describe simulated annealing search algorithm.   [2+2]
(b) In particular, precise how the algorithm behaves at very high temperatures and at   CO1
very low temperatures.

Q3. Two players, MAX and MIN, are playing a game. The game tree is shown below.   [2+2+2]
Upward-pointing triangles denote decisions by MAX; downward-pointing triangles   CO1
denote decisions by MIN. Numbers on the terminal nodes show the final score: MAX
seeks to maximize the final score, MIN seeks to minimize the final score.

1   1   3   -2   -1   -6   6   1
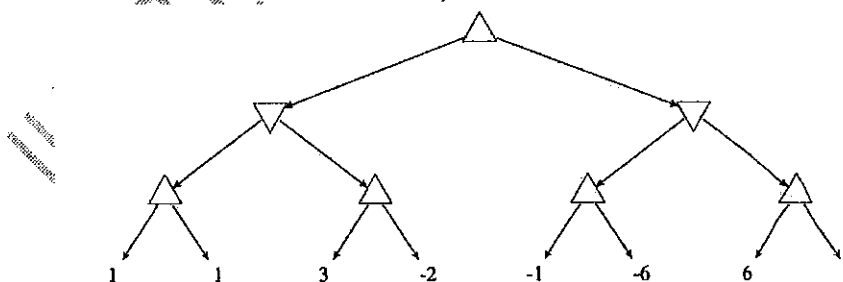
(a) Write the minimax value of each non-terminal node (each upward-pointing or
downward-pointing triangle) next to it.
(b) Suppose that the minimax values of the nodes at each level are computed in order,
from left to right. Encircle the edges that would be pruned (eliminated from
consideration) using alpha-beta pruning.

(c) In this game, alpha-beta pruning did not change the minimax value of the start node. Is there any deterministic two-player game tree in which alpha-beta pruning changes the minimax value of the start node? Why or why not?

Q4. (a) What are the main challenges of adversarial search as contrasted with single-agent search? [2+4]
CO1

(b) Consider the following expectiminimax tree:
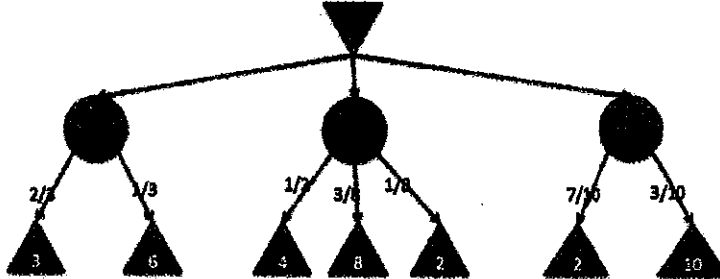
Circle nodes are chance nodes, the top node is a min node, and the bottom nodes are max nodes.

(a) For each circle, calculate the node values, as per expectiminimax definition.

(b) Which action should the min player take?

Q5. Differentiate between forward and backward chaining mode of the Inference Engine? [5]
CO3

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TEST -2 EXAMINATION- 2023

B.Tech-V Semester (CSE/IT/ECM)

COURSE CODE (CREDITS): 20B1WCI532 (02)   MAX. MARKS: 25

COURSE NAME: Cloud Computing: Concepts, Technology & Architecture

COURSE INSTRUCTORS: ARV   MAX. TIME: 1 Hour 30 Minutes

Note:

(a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

1. Explain the concept of virtualization and how does it differ from traditional computing? Discuss the benefits of server virtualization in data centers?   **[4 Marks][CO-2]**

2. Write the difference between Type 1 and Type 2 hypervisors. When would you use each type? What is the purpose of virtual machine (VM) isolation in hypervisors?

    [4 Marks][CO-2]

3. Discuss the Hyper-V Architecture with suitable diagram. Write down the advantages and disadvantages of Hyper-V architecture.   **[5 Marks][CO-2]**

4. Explain the concept of access control in cloud computing. Discuss the various access control models used in cloud computing?   **[5 Marks][CO-3]**

5. Consider the following use case:

    Facebook has a list of friends (note that friends are a bi-directional thing on Facebook. If A is friend of B then B will be friend of A). We've decided to pre-compute calculations when we can to reduce the processing time of requests. One common processing request can be "A and B have 20 friends in common" feature. When you visit someone's profile, you see a list of friends that you have in common. This list doesn't change frequently so it'd be wasteful to recalculate it every time you visited the profile.
    Consider, given a social network like Facebook which is having tens of millions of users, using MapReduce find common friends of Facebook data to identify "common friends" among all pairs of users .   **[7 Marks][CO-3]**

Hint:
Assume the friends are stored as Person->[List of Friends], our friends list is then:

A -> B C D
B -> A C D E
C -> A B D E
D -> A B C E
E -> B C D

Each line will be an argument to a mapper. For every friend in the list of friends, generate the output using mapper as a key-value pair (The key will be a friend along with the person. The value will be the list of friends). Sort the pairs according the keys so that the friends are in order, causing all pairs of friends to go to the same reducer. After all the mappers are done running, generate a list like this:

For map(A -> B C D) :

(A B) -> B C D
(A C) -> B C D
(A D) -> B C D

Send the outputs of each mapper to the recuders and group them according to their keys.
The reduce function will simply intersect the lists of values and output the same key with the result of the intersection.
For example, reduce((A B) -> (A C D E) (B C D)) will output (A B) : (C D) and means that friends A and B have C and D as common friends.

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TEST -2 EXAMINATION- 2023

B.Tech-I Semester (CSE/IT/ECE/CE/BT/BI)

COURSE CODE (CREDITS): 18B11CI513 (3)   MAX. MARKS: 25

COURSE NAME: Formal Languages and Automata The ory

COURSE INSTRUCTORS: RKI, DHA,SGL, VKS   MAX. TIME: 1 Hour 30 Minutes

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Note: (a) All questions are compulsory

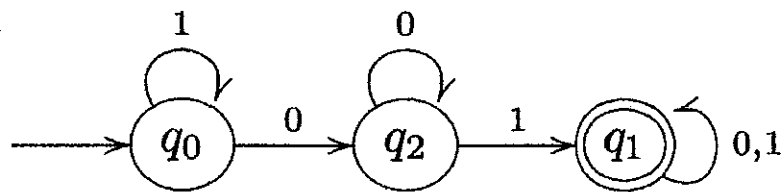*(b)Marks are indicated against each question in square brackets.*

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

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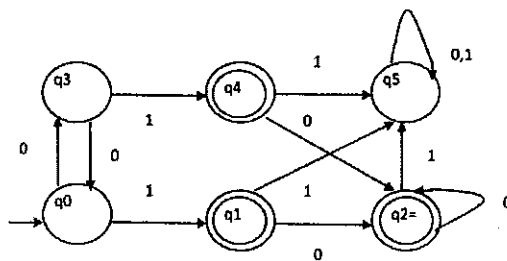Q1. Assume L_1, L_2 and L_3 are regular language.

(i) Proof $(L_1 \cap L_2) \cup L_3$ is regular language.   [3] [CO3]

(ii) Proof $(L_1 \cap L_2) \cup L_3 \neq L_1 \cap (L_2 \cup L_3)$.   [2] [CO3]

Q2. (i) Convert the below FSA to regular expression.

(ii) Perform the DFA minimization on given finite automata

                                                  [2+3] [CO3]

Q3. Proof $L=\{a^n b^n c^n \mid n \geq 0\}$ is non regular by pumping lemma. Why pumping lemma is a contradiction proof ?   [4+1] [CO3]

Q4. (i) Explain the role of context free grammar in programming language with an example.

     (ii) Provide the context free grammar for $L=\{a^n b^n WW^r \mid n \geq 0$ and $W \in \sum^*$ and $\sum = \{a, b\}\}$

(iii) E->E+E | E*E|E /E | F

F-> a|b

Proof the above grammar is ambiguous .   [1+2+2] [CO4]

Q5. Simplify the below given grammar.

S->AB, A->a/Null, B-b/C, C->D, D->A, E->c/null , assume S is starting variable.

Derive the language generated by the above grammar?

                                                            [4+1] [CO4]

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2023

M.Tech-I Semester (CSE)

COURSE CODE (CREDITS): 22M11CI112(3) MAX. MARKS: 25

COURSE NAME: Introduction to Data Science

COURSE INSTRUCTORS: Dr. Anita MAX. TIME: 1 Hour 30

Minutes

Note: (a) All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for

solving problems

Q1a. Differentiate between Data Science, Machine Learning and AI. Python or R - Which one would you prefer for text analytics? (1.5) CO1

Q1b. Write a function in Python or R programming that takes in two sorted lists and outputs a sorted list that is their union. (1.5) CO2

Q1c What Does P-Value Signify About The Statistical Data? Explain with code. (2) CO3

Q2a Write the code in Python or R programming to calculate the Factorial of a number using Recursion. (1.5) CO2

Q2b What is the difference between skewed and uniform distribution? Write code also (2) CO1

Q2c Differentiate between func and func() in Python (1) CO2

Q2d In a time interval of 15-minutes, the probability that you may see a shooting star or a bunch of them is 0.3. What is the percentage chance of you seeing at least one star shooting from the sky if you are under it for about an hour? (1.5) CO5

Q2e Correction/ output of the following code: (4) CO2

(A) 350 = Number

WHILE Number<=1000:

if Number=>750

print (Number)

Number=Number+100

```
        else

        print( Number*2)

        Number=Number+50 Print( x-y)
```

(B)
```
Val = int(rawinput("Value:"))

        Adder = 0

        for C in range(1,Val,3)

          Adder+=C

            if C%2=0:

            Print (C*10)

            Else:

            Print (C*)

            print (Adder)
```

(C)
```
library("plotrix")

n <- c(178,160,136,227,123, 23,46,67,1,235)

print(std.error(a))
```

(D)
```
ggplot(mydata100, aes(gender, fill=workshop) ) +   geom_bar(position="fill")
```

3a Fill in the blanks (5) CO2

1.R comes with a _____ to help you optimize your code and improve its performance.

2._____ suspends the execution of a function wherever it is called and puts the function in debug mode.

3.The _____ function takes a vector or other objects and splits it into groups determined by a factor or list of factors.

4._____ involves predicting a response with meaningful magnitude, such as quantity sold, stock price, or return on investment.

5. How Statistical analysis is performed in R language?

3b How Geo map and time series can be plotted in Python. (5) CO4

COURSE CODE (CREDITS): 18B11CI311 (3)   MAX. MARKS: 25

COURSE NAME: Object-Oriented Systems and Programming

COURSE INSTRUCTORS: A. Sharma, A. Kumar, D. Gupta, H.S. Rawat & M. Singh   MAX. TIME: 1:30 Hr.

Note: 1) All questions are compulsory. Marks and COs are indicated against each question. 2) Attempt questions in the given sequence. 3) Be precise in your answers. 4) Write neatly.

Q 1. Create a C++ class called Employee to represent an employee's information, including their [3]

name, employee ID and salary. Implement the following requirements: CO3

   a) A default constructor with no parameters that initializes the name to "Unknown" employee ID to 0, and salary to 0.0.

   b) A parameterized constructor that takes the name, employee ID, and salary as arguments.

   c) Overload the assignment operator to allow assigning one Employee object to another.

   d) Implement a copy constructor for the Employee class.

In the main () function, create two Employee objects using default and parameterized constructors. Then, create a third Employee object by copying one of the existing objects. Finally, demonstrate the use of the assignment operator by assigning the values of one object to another.

Q 2. Define two user-defined classes - Celsius and Fahrenheit, to represent temperatures in celsius [3]

and fahrenheit respectively. Write a program that demonstrates how to convert an object of
one user-defined type class Celsius to an object of another user-defined type class Fahrenheit   CO3
using a constructor and a conversion function.   Note: $F = (C * 9/5) + 32$

Q 3. Write a C++ program to create a text file named "data.txt" with the following content: [3]

    10
    20   CO4
    30
    40
    50

Assume that the above file has gone through multiple changes after its creation but it still contains at least two numbers. Write another C++ program that reads the "data.txt" file and displays the second last number from the file.

Q 4. Write a base class CBase and its derived class CDerived to accomplish the following: [3]

    a) CBase is an abstract class having a pure virtual function vFunction ().

    b) CDerived is derived in public mode from CBase and overrides vFunction () to display   CO5
       "*No legacy is so rich as honesty*".

    c) In main () function, implement dynamic binding to invoke vFunction () of CDerived.

Finally, elaborate the role of virtual table (vtable) and vtable pointer in the aforementioned scenario.

Q 5. Describe the following (*max. 8-10 sentences*): [2*5 = 10]

    a) C++ cannot overload .*, :: and ?: operators. Why?

    b) File pointers and modes: i) seekg (n, ios:cur)   ii) tellp ()   iii) ios::ate   iv) ios::trunc   CO3-5

    c) C++ supports virtual destructor, but not virtual constructor. Why?

    d) Diamond problem leads to ambiguity in multiple inheritance. Why?

    e) What are different ways to prevent object slicing in C++?

Q 6. Mention the **output** of each of following program and also give **brief explanation** (*2-3 sentences*) in support of your answer. Assume the following statements are already there: [1*3 = 3]

#include <iostream>   CO3-5

using namespace std;

a)
```cpp
class CTest {
private:
    int iCount;
public:
    CTest(int iCount)
    {
        this -> iCount = iCount;
        cout << iCount;
    }
    CTest(int iCount, int iTemp = 1)
    {
        this -> iCount = iCount * iTemp;
        cout << this -> iCount;
    }
};

int main ()
{
    CTest (2, 3);
    CTest (4);
    return 0;
}
```

b)
```cpp
class CBase {
    public:
    virtual void vTemp (int) = 0;
    void vTemp () {
        cout << "Inside CBase" << endl;
    }
};
class CDerived1 : public CBase {
    void vTemp () {
        cout << "Inside CDerived1"<< endl; }
};
class CDerived2 : public CDerived1 {
    void vTemp (int iCount) {
        cout << "Inside CDerived2"<< endl; }
};
int main () {
    CBase *ptr;
    CDerived1 obj1;
    CDerived2 obj2;
    ptr = &obj1;
    ptr -> vTemp ();
    ptr = &obj2;
    ptr -> vTemp (2);
    return 0;
}
```

c)
```cpp
class CBase {
    private:
    int iCount;
    public:
    CBase () {
        cout << "Inside Constructor" << endl;
    }
    ~CBase () {
        cout << "Inside Destructor" << endl;
    }
};
class CDerived : public CBase {
    public:
    CDerived () {
        cout << "Inside Constructor 1" << endl;
    }
    ~ CDerived () {
        cout << "Inside Destructor 1";
    }
};
int main () {
    CBase *ptrBase = new CDerived;
    delete ptrBase;
    return 0;
}
```

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TEST -2 EXAMINATION- October 2023

M.Tech-I Semester (Data Science)

COURSE CODE (CREDITS): 19B1WCI738   MAX. MARKS: 25

COURSE NAME: Introduction to Statistical Learning

COURSE INSTRUCTORS: HRI   MAX. TIME: 1 Hour 30 Minutes

Note: (a)All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q1. In the following linear regression model   **(CO1) [2x2 = 04 Marks]**

$$y = \beta_0 + \beta_1 x_1$$

(a) Compute the standard error associated with β_0 and β_1.

(b) Compute 95% confidence intervals for β_0 and β_1.

Q2. Attempt any one from the following.   **(CO1) [03 Marks]**

How do the t-test and p-value help in describing the significance of a coefficient associated with a predictor?

OR

Among R2 statistic and Residual Standard Error (RSE), which is considered a better model accuracy evaluation metric and why?

Q3. The following two models were developed for spam email detection- Model-1 and Model-2. Which model is better and why?   **(CO2) [04 Marks]**

Model-1	Actual Spam Email (Yes)	Actual Spam Email (No)	Total
Predicted Spam Email (Yes)	200	300	500
Predicted Spam Email (No)	200	300	500
Total	400	600	1000

Model-2	Actual Spam Email (Yes)	Actual Spam Email (No)	Total
Predicted Spam Email (Yes)	250	200	450
Predicted Spam Email (No)	150	400	550
Total	400	600	1000

Q4. How does bootstrap approach allow us to emulate the process of obtaining new sample sets? Describe the formula to compute the standard error of these bootstrap estimates.

(CO2) [04 Marks]

Q5. Write the best subset selection algorithm that involves identifying a subset of the p predictors that is believed to be related to the response. **(CO2)[04 Marks]**

Q6. Describe Ridge Regression with the mathematical explanation. Draw bias, variance and MSE-test w.r.t. the hyperparameter λ used in the shrinkage method Ridge Regression with appropriate explanation.

(CO2) [04 Marks]

COURSE CODE (CREDITS): 19B11CI111 (2) MAX. MARKS: 25

COURSE NAME: Programming for Problem Solving II
COURSE INSTRUCTORS: VSG, RBT, YGL, AVA, KUS, PVM, FAZ MAX. TIME: 1 Hour 30 Min

Note: All questions are compulsory. Marks are indicated against each question in square brackets. Attempt all parts of a question together.

1. Find the output for the following C programs. [CO3] [1 + 1 + 1 + 2 = 5 Marks]

```
a)
#include<stdio.h>
int main( )
{
int a ;

a = 5 % 5 + 5 * 5 - 5 / 5 ;
printf(" %d", a);

return 0;
}
```

```
b)
#include<stdio.h>
int main( )
{
int a, b ;
a= 100;
b=0;
printf(" %d %d", a, b);

return 0;
}
```

```
c)
#include<stdio.h>
int main( )
{
int x =2 ;
int y = 6;
int z = 6;
x = y != z;
printf(" %d", x);
return 0;
}
```

d) Write a function that takes an integer and returns its reverse number. For example, given the number 5463, the function should return 3645.

2. [CO4] [2 + 2 + 1 Marks]

a) (*Calculating the value of II*). Calculate the approximate value of Π from the series. Π = (4 / 1) - (4 / 3) + (4 / 5) - (4 / 7) + (4 / 9) - (4 / 11) + ...

b) (*Conversion Celsius to Fahrenheit*). Write a C program that converts temperature from 30°C to 35°C (in step of 1) to the Fahrenheit scale. The program should print a table displaying temperature in the two scales side by side. [F = (9.0 / 5.0) * C + 32.0].

c) (*Sum of integers*). Write a C program that will read the value for n (n is a positive integer) and calculate the sum of first n even integers (eg. 2 + 4 + 6 + 8 .... + 2n).

3. Write the C code to generate the following pattern: [CO4] [2.5 + 2.5 Marks]

```
a)

              1
           2  3
        4  5  6
     7  8  9  10
  11 12 13 14 15
```

```
b)

  *
  *  *
  *  *  *
  *  *  *  *
  *  *  *  *  *
```

4. [CO4] [1.5 + 1.5 + 2 = 5 Marks]
   a) Find the output of the following code.
   b) Find the output of the following code.
   c) The skeletal structure of a C program is shown below (4 c). Complete the c code so that the function *square_cube* computes square and cube of the number *n*.

```
4 a)
#include<stdio.h>
int main( )
{
int i, j, sum =0;
for ( i =5 ; i >= 1 ; i -- )
{
  for ( j = 1 ; j <= i ; j++)
  {
    printf(" %d", i);
    sum += j;
  }
 printf("%d", i);
}
printf("Sum is %d ", sum);
return 0;
}
```

```
4 b)
#include<stdio.h>
int main( )
{
int i , j , x = 0;
for ( i = 0 ; i < 5 ; ++i )
{
    for ( j = 0 ; j < i ; ++j )
    { x += ( i + j -1 );
       printf(" %d",x);
       continue;
    }
}

printf (" %d", x ) ;
return 0;
}
```

```
4 c)
#include<stdio.h>
void square_cube(int n, int * square, int *
cube)
{
 // complete the code

}
int main( )
{
int n , square , cube;
printf (" Enter number n:") ;
scanf (" %d", &n ) ;
square_cube(n , &square , & cube);
printf (" %d %d", square , cube ) ;
return 0;
}
```

5. [CO5] [1 + 2 + 2 = 5 Marks]
a) Write a function to swap the values of arguments using call by reference.
b) Write a C program to read n number of values in an array and display the sum.
c) Draw the flowchart for the nested for loops.

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TEST -2 EXAMINATION- 2023

B.Tech-VII Semester (CSE/IT)

COURSE CODE (CREDITS): 19B1WCI731   MAX. MARKS: 25

COURSE NAME: Computational Data Analysis

COURSE INSTRUCTORS: Dr. Nishant Sharma   MAX. TIME: 1 Hour 30 Minutes

Note: (a)All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q1. You are working on a text classification problem using Naive Bayes, and you have a dataset with the following training data for two classes, "Spam" and "Not Spam." You want to classify a new document based on the word "offer."

Class	Number of Documents Containing "offer" (x)	Total Documents in Class (N)
Spam	120	400
Not Spam	50	600

Using Laplacian Smoothing with a smoothing factor (alpha) of 1, calculate the Naive Bayes probability of the new document belonging to the "Spam" class and the "Not Spam" class based on the presence of the word "offer."   **[5 marks] [CO-2]**

Q2. What is significance of geometric margins in SVM classification? Suppose you are working with a binary classification problem using a linear SVM. Decision boundary for SVM is represented by the equation 3x–4y–7=0. The equation of the hyperplane is represented as ax+by+c=0. Based on above information, calculate the geometric margin for the hyperplane for a data point (2, 1).   **[4 marks] [CO-3]**

Q3. Elaborate on the concept of Cross-Validation and its significance in model selection. How can it help avoid overfitting?   **[4 marks] [CO-4]**

Q4. Describe Bayesian Regression and Bayesian Logistic Regression. How are these techniques useful in modeling and prediction?   **[3 marks] [CO-4]**

Q5. What is feature selection, and why is it important in machine learning? List and briefly explain various feature selection techniques with suitable illustrations.   **[4 marks] [CO-4]**

Q6. Discuss the differences between DBSCAN, k-means, and Hierarchical clustering. Discuss different scenarios where one maybe preferred over another? **[5 marks] [CO-3]**