DEPARTMENT OF COMPUTER SCIENCE
ROLLWALA COMPUTER CENTER GUJARAT UNIVERSITY
MSC (AI & ML) SEM I

Subject: Object Oriented Concept and Programming using c++
Sessional Examination – I

Time : 1hr 30min | **Time: 10:30 to 12:00**
Date: 18th September, 2019 | **Max. Marks: 30**

Q1. ***Answer in Short.*** **[04]**

(a) *What is the difference between union and class?*
(b) *What is inline function?*
(c) *What is the use of destructors?*
(d) What is the use of protected access modifier in class?

Q2. Attempt the following Questions. (Any Two) **[10]**

(a) Explain Different data type in c++.
(b) Explain MIL with example?
(c) Explain Operator Overloading with example.

Q3. Attempt the following Questions. (Any Two) **[10]**

(a) Explain Friend function with its merits and demerits?
(b) Explain classes with multiple generic data types?
(c) Explain derivation using different access modifier.

in

Q4. Write a program to implement template class STACK with its all operation. **[06]**

OR

Write a program to define a class of student with appropriate data members and marks of three subject. Input 10 student record and display the students information whose percentage is more than 70.

M. Sc. (AI & ML) - I
DEPARTMENT OF COMPUTER SCIENCE
ROLLWALA COMPUTER CENTER
GUJARAT UNIVERSITY
PROBLEM SOLVING WITH PYTHON

Date : 19 /09/2018
Time : 10.30 a.m. – 12.30 noon

Max. Marks : 30

Note : (1) Make necessary assumptions wherever necessary.
(2) Write precise and to the point answers.

Q.1 Answer the following **[12]**

(a) What are the different loop control statements available in Python? Explain with suitable examples

(b) Give a comparison between lists, tuples, dictionaries and sets.

(c) Write a recursive Python function that recursively computes sum of elements in a list of lists.
Sample Input: [1, 2, [3,4], [5,6]]
Expected Result: 21

Q.2 Do as directed. **[10]**

(a) One of the following 10 statements generates an error. Which one? Justify your answer

```
x = [1,"abcd",2,"efgh",[3,4]]  # Statement 1
y = x[0:50]                    # Statement 2
z = y                          # Statement 3
w = x                          # Statement 4
x[1] = x[1] + 'd'              # Statement 5
x[1][1] = 'y'                  # Statement 6
y[2] = 4                       # Statement 7
z[0] = 0                       # Statement 8
w[4][0] = 1000                 # Statement 9
a = (x[4][1] == 4)             # Statement 10
```

(b) What will be the output of following Python code ? Justify your answer

```
def g(x):
  (q,d) = (1,0)
  while q <= x:
    (q,d) = (q*10,d+1)
  return(d)

print(g(31415927))
```

(c) Consider the following lines of Python code.

```
x = [13,4,17,1000]
w = x[1:]
u = x[1:]
y = x
u[0] = 50
y[1] = 40
```

Which of the following is correct? Justify your answer

(i) x[1] == 40, y[1] == 40, w[0] == 50, u[0] == 50
(ii) x[1] == 4, y[1] == 40, w[0] == 4, u[0] == 50
(iii) x[1] == 50, y[1] == 50, w[0] == 50, u[0] == 50
(iv) x[1] == 40, y[1] == 40, w[0] == 4, u[0] == 50

(d) Suppose u and v both denote sets in Python. Under what condition can we guarantee that u - (u - v) == v? Justify your answer

(i) This is true for any u and v.
(ii) The set u should be a subset of the set v
(iii) The set v should be a subset of the set u
(iv) The sets u and v should be disjoint.

(e) What will be the value of endmsg after executing the following lines? Justify your answer

```
startmsg = "hello"
endmsg = ""
for i in range(0,len(startmsg)):
        endmsg = startmsg[i] + endmsg

print(endmsg)
```

Q.3 Compare and contrast the following giving suitable examples (Any Two) [08]

(a) Compiled Languages & Interpreted languages
(b) Mutable & Immutable data types
(c) Deep copy & Shallow copy

GOOD LUCK

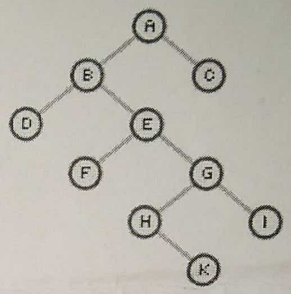
Department of Computer Science
Rollwala Computer Center
Sessional Examination-I
M.Sc. Semester – I
Subject: Artificial Intelligence

Date: 17/09/2019
Time: 2 Hrs.

Max. Marks: 40

Q-1. Answer the following questions: **(Any 10)** **[20]**

1. Define Artificial Intelligence. Write any 2 definitions of AI.
2. Explain Turing Test. Which conclusions were drawn from the experiment?
3. What is State Space Representation? Draw a representation of 8-Queen problem.
4. What do you understand by instance and isa? Represent using instance and isa relationship:
   Smith is an all rounder cricketer.
5. Explain AI technique for playing Tic-Tac-Toe assuming a regular 3X3 board.
6. Considering Blocks World Problem, show the importance of Global Heuristic Function.
7. Why is Generate and Test called Blind Search method? Which functions are used in this method?
8. Show the DFS traversal of given tree.
9. What is a Production System?
10. Distinguish between OR Graph and AND-OR Graph.
11. What are Heuristics? Why are these required?



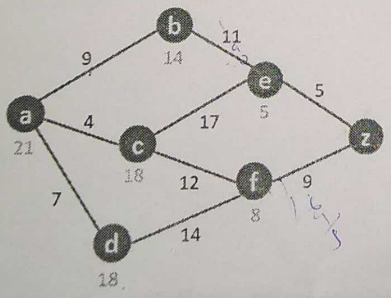
Q-2. A. Analyze the Seven Problem characteristics for Missionaries and Cannibals Problem. **[04]**

B. Take a sample tree to show how Simple Hill Climbing differs from Steepest Ascent Hill Climbing. **[02]**

Q-3. Attempt the following questions: **(Any 2)** **[14]**

A. Explain Best First Search algorithm with the help of proper example.

B. What are the characteristics of A* Algorithm. Trace the algorithm for the given tree.
Note: a is initial state and z is goal state.



C. Consider the following statements:

1. Rohan likes all kinds of food.
2. Anything anyone eats and is not killed by is food.
3. Apple is a fruit.
4. Shreya eats peanuts and is still alive.
5. Pranav eats everything that Shreya eats.
6. Rohan and Pranav are friends.

a) Represent the above statements in first order predicate logic.

b) Answer using backward chaining: Does Rohan likes peanuts.

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Department of Computer Science
Rollwala Computer Centre
Gujarat University
M.Sc – I (AI & ML)
Sessional – I

Subject: CONM **Date: 20 / 09 / 2019**
Time: 1 hr & 30 min. **Max. Marks: 30**

Que: 1 Attempt the following: **(Any THREE)** **[12]**

(a) State the property illustrated in following equations :

$$\begin{bmatrix} 0 & 5 & -2 \\ 1 & -3 & 6 \\ 4 & -1 & 8 \end{bmatrix} = - \begin{bmatrix} 1 & -3 & 6 \\ 0 & 5 & -2 \\ 4 & -1 & 8 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -6 & 4 \\ 3 & 5 & -2 \\ 1 & 6 & 3 \end{bmatrix} = 2 \begin{bmatrix} 1 & -3 & 2 \\ 3 & 5 & -2 \\ 1 & 6 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 3 & -4 \\ 2 & 0 & -3 \\ 5 & -4 & 7 \end{bmatrix} = \begin{bmatrix} 1 & 3 & -4 \\ 0 & -6 & 5 \\ 5 & -4 & 7 \end{bmatrix}$$

(b) Use property det (A . B) = $\det(A) \cdot \det(B)$ to compute det B^5, Where B = $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$

(c) Let A and P be square matrices, with P invertible. Show that $\det(PAP^{-1}) = \det A$.

(d) Use determinants to find out if the matrix $\begin{bmatrix} 2 & 3 & 0 \\ 1 & 3 & 4 \\ 1 & 2 & 1 \end{bmatrix}$ is invertible.

Que: 2 Attempt the following: **(Any THREE)** **[18]**

1. Explain Newton Raphson method. Give its graphical representation. Show graphically any two situations, when it may fail to converge.
2. Explain different stopping criterions in methods for finding roots of an equation f(x) = 0.
3. Let exact value of radius of a wire be 0 .0174 cm. Its value estimated is 0.02 cm . Calculate
   i. Absolute Error
   ii. Relative Error
   iii. Percentage Error
4. Find the negative root of $x^3 - 7x + 3$ by the bisection method correct up to three decimal places.
5. Apply Gradient Descent method to minimize the function $y = x^2 + x + 1$ .Assume a step size of 0.3 and a starting point of x=0 .

M. Sc. (AI & ML)

Department of Computer Science

Rollwala Computer Center

Gujarat University

Mathematical Foundations

Date: 16/09/2019 Maximum Marks: 40 Time: 10.30 a.m. to 12.00 noon

Instructions: (1) Figure to the right indicates full marks of the respective question.
(2) Intermediate calculation steps and results are to be shown.

Q.1. Answer the following (Any Two) **18**

(a) Let $P = \{x \in \mathbb{N} \mid 2 < x \leq 8\}$, $Q = \{x \in \mathbb{N} \mid 0 \leq x < 5\}$, $R = \{x \in \mathbb{N} \mid 1 \leq x \leq 10\}$. Let $U = \{x \in \mathbb{Z} \mid -2 \leq x \leq 12\}$ be the universal set. Determine the following.

1. $P \cup R$
2. $P \Delta R$
3. Verify $(P \cup Q)' = P' \cap Q'$

(b) Let $f(x) = -x^2 + 4x - 3$. Determine the maximum value of $f(x)$ on the intervals $[0, 4]$ and $[-1, 1]$. Graph $f(x)$ to check your answer.

(c) Given that $z = \sqrt{x^2 + y^2 e^{xy}}$, $x = 2u + v$, $y = u/v$. Find $\partial z/\partial u$ and $\partial z/\partial v$ using the chain rule.

Q.2. Answer the following (Any Two) **12**

(a) Find $\frac{dy}{dx}$ where

1. $y = \sqrt{\frac{1-x}{1+x}}$
2. $y = \sin\left(\frac{1-e^x}{e^{2x}}\right)$

(b) Determine whether the function $f : \mathbb{Z} \times \mathbb{N} \to \mathbb{Z}$, defined by $f(n, m) = \frac{n}{m}$ for all $n \in \mathbb{Z}$ and for all $m \in \mathbb{N}$, is one-one, onto, or both one-one and onto.

(c) Find equations of the tangent and normal lines to $f(x) = x^3 - 2x^2 + 4$ at $(2, 4)$.

Q.3. Answer the following (Any Two) **10**

(a) Using Taylor series expansion, obtain the approximate value of $\log_e(1.05)$.

(b) Find all local maximum and minimum points of $f = x^2 - xy + 2y^2 - 5x + 6y - 9$.

(c) State relation between directional derivative and gradient. What insights you obtained from this relation about the function f and the surface $z = f(x, y)$?

********** Good Luck **********