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Computer Engineering Department, S V N I T, Surat.
Supplementary Examination, November 2018
BTech. IV (CO) Semester – 7th
PRINCIPLE OF PROGRAMMING LANGUAGES: CO405

Date: 12th Feb 2019

Time: 14:00 hrs to 17:00 hrs

Max Marks: 50

Instructions:

- Write your B Tech Admission No/Roll No and other details clearly on the answer books while write your BTech Admission No on the question paper, too.
- Assume any necessary data but give proper justifications.
- Be precise and clear in answering the questions.
- Support your answer with necessary diagrams and examples.

Q-1	Answer the following questions:	[06]									
1.	Explain the difference between the concepts Abstraction and Encapsulation.										
2.	State Reason behind exception handling importance in a program.										
3.	Write the Object Oriented Logic to delete the element of the link-list without using the head.										
Q-2	Answer the following questions:	[09]									
1.	Differentiate between OOP and POP.										
2.	Explain Templates and its working in C++ using the example any search method.										
3.	What do you mean by Virtual Function? Explain its use.										
Q-3	Do as directed:	[10]									
1.	Create class circle and write proper methods set and get parameters, Create another class rectangle write proper methods set and get parameters, Write a friend function to calculate total area covered by a circle object and a rectangle object.										
2.	Write Object Oriented Program directed as bellow: Given two string of equal length, find how many times the corresponding position in two strings hold exactly the same characters ignore the case (no case sensitivity). The output is an integer value displaying the number of times characters are same at the corresponding position Example : S1 = hello S2 = HEY Output is 2										
Q-4	Write a Turbo PROLOG programs:	[10]									
1.	Write a Prolog program to find the last element of a list.										
2.	Write a Prolog program to find out whether a list is a palindrome.										
3.	Write a Prolog program to eliminate consecutive duplicates of list elements.										
4.	Write a Prolog program to split a list into two parts; the length of the first part is given										
5.	Write a Prolog program to determine the greatest common divisor of two positive integer numbers.										
Q-5	Answer the following questions: (Any Five)	[15]									
1.	Represent each of these statements as a set of Prolog clauses: a. bill only eats chocolates, bananas or cheese. b. the square root of 16 is 4 or -4. c. wales, Ireland and scotland are all countries.										
2.	Develop a Turbo Prolog programs for 3 x 3 Knight's tour problem <table border="1" style="margin: 10px auto;"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td><td>9</td></tr> </table> <p>goal: route (1, 3, [1]) // prolog reply: [3, 4, 9, 2, 7, 6, 1],[3, 8, 1]</p> <p>goal: route (1, 8, [1]) // prolog reply: [8, 3, 4, 9, 2, 7, 6, 1],[8, 1]</p>	1	2	3	4	5	6	7	8	9	
1	2	3									
4	5	6									
7	8	9									
3.	Explain the usage of cut & fail in prolog. Mention the different types of cut.										
4.	Explain the usage of dynamic databases by giving suitable examples.										
5.	Explain unification in prolog with example.										
6.	How I/O works in prolog.										

Computer Science and Engineering Department, SVNIT - Surat
End Semester Examination - December - 2021
B.Tech IV – VII Semester
Principles of Programming Languages (CO405)

Date: 1st December 2021

Time: 9:30 AM to 12:30 PM

Max Marks: 50

Instructions:

1. Write your Admission No/Roll No and other details clearly on the answer books.
2. Write your Admission No on the question paper.
3. Be precise and clear in answering the questions.
4. Support your answer with necessary diagrams and examples.

Q1 Answer the following questions:

A. For the following Prolog program.

(04)

w(11).

w(22).

catch1(X) :- w(X), fail; w(X).

catch1(X) :- w(X).

catch2(X) :- w(X), !, fail; w(X).

catch2(X) :- w(X).

catch3(X) :- !, w(X), fail; w(X).

catch3(X) :- w(X).

catch4(X) :- !, (w(X), fail; w(X)).

catch4(X) :- w(X).

- I. Give all possible answers to the query *catch1(X)*, in the order that Prolog would produce them.
- II. Give all possible answers to the query *catch2(X)*, in the order that prolog would produce them.
- III. Give all possible answers to the query *catch3(X)*, in the order that prolog would produce them.
- IV. Give all possible answers to the query *catch4(X)*, in the order that prolog would produce them.

B. Write a complete PROLOG program using the predicate: *add_all(P,Q)*

(03)

i.e. for a given list of integers P, it returns a list Q of integers, such that each element in Q is the sum of all elements in P upto the same positions.

add_all([1,3],Q)

Q = [1,4]

add_all([1,2,3,4],Q)

Q = [1,3,6,10]

add_all([1],Q)

Q = [1]

(03)

- C. Define with justification following relation in PROLOG:

flatten(List, Flatlist)

where List can be a list of lists, and Flatlist is List ,flattened' so that the elements of List's sublists (or sub-sublists) are reorganized as one plain list. For example:

?- flatten([a,b,[c,d],[[e]]],L).

L = [a,b,c,d,e]

- D. Write a PROLOG Program which separates strings of the odd length and even length in different files *odd.txt* and *even.txt* respectively. Take a list of strings as input from the user. (03)

- E. Consider the following Prolog program. (02)

q([], Q, Q).

q([A|L], S, SL) :- A > 5, !, q(L, [A|S], SL).

q([A|L], S, SL) :- q(L, S, SL).

Show all the answers generated by Prolog for the following goal:

q([2, 5, 7, 9, 6], [], Result).

- F. Write a complete PROLOG program using the predicate:

(03)

remove2nd(List, NewList) that asserts that NewList is the same as a List except that the second top-level item is removed.

e.g.

remove2nd([a, b, c], [a, c]) returns true/yes

remove2nd([a, b], X) returns *X = [a]*

remove2nd([a], X) returns *X = [a]*

- G. A knowledge base contains the following statements:

(03)

Everyone who loves all animals is loved by someone.

Anyone who kills an animal is loved by no one.

Jack loves all animals.

Either Jack or Curiosity killed Tuna, the cat.

- I. Convert these statements into FOL.
II. Convert each FOL statement to CNF.
III. Using resolution, prove that Curiosity killed the cat.
- II. Convert to predicate logic and also eliminate implications:
- I. Anyone passing his history exams and winning the lottery is happy.
II. But anyone who studies or is lucky can pass all his exams.
III. John did not study, but John is lucky.

(03)

1. Explain *modes ponens* and *substitution* operation for Logic Programming along with examples. Is Propositional Logic better than Predicate Logic? Justify. (03)

Q2 Answer the following questions:

- A. Find errors(if any) in following C++ statements: (03)

- I. `char *cp = vp; // vp is a void pointer`
- II. `int code = three; // three is an enumerator`
- III. `enum (green, yellow, red);`
- IV. `int const sp = total;`
- V. `const int array_size;`
- VI. `for (i=1; int i<10; i++) cout << i << "\n";`

- B. What are the characteristics of *co-routine*? List the languages which allow co-routines. (03)

- C. Define a class *String* that could work as a user-defined string type. Include constructors that will enable us to create an uninitialized string (04)

String s1; // string with length 0

and also initialize an object with a string constant at the time of creation like

String s2("Well done!");

Include a function that adds two strings to make a third string. Note that the statement

s2 = s1;

will be a perfectly reasonable expression to copy one string to another.

Write a complete program in C++ to test your class to see that it does the following tasks:

- I. Creates uninitialized string objects.
- II. Creates objects with string constants.
- III. Concatenates two strings properly.
- IV. Displays a desired string object.

- D. An educational institution wishes to maintain a database of its employees. The database is divided into a number of classes whose hierarchical relationships are shown in the following data. The data also shows the minimum information required for each class. Using C++ specify all classes and define functions to create the database and retrieve individual information as and when required. (04)

staff(code, name) → teacher(subject, publication), typist(speed), officer(grade)

typist(speed) → regular, casual (daily wages)

- E. What is the need of an activation record in implementing a subprogram? Explain with an example. (03)

- F. Write an interactive, menu-driven program that will access the file created in (04) following form and implement the tasks:

John 23456

Ahmed 9876.

.....

- I. Determine the telephone number of the specified person.
 - II. Determine the name if a telephone number is known.
 - III. Update the telephone number, whenever there is a change.
- G. State which of the following function definitions are illegal. (02)

I. `template<class A, B>`

`void fun(A, B)`

`{.....};`

II. `template<class A, class A>`

`void fun(A, A)`

`{.....};`

III. `template<class A>`

`void fun(A, A)`

`{.....};`

IV. `template<class T, typename R>`

`T fun(T, R)`

`{.....};`

Computer Engineering Department, SVNIT - Surat
Supplementary Examination- February - 2020
B.Tech. IV – VII Semester
Course: Principles of Programming Languages (CO405)

Date: 11th February 2020

Time: 14:00 hrs to 17:00 hrs

Max Marks: 50

Instructions:

1. Write your Admission No/Roll No and other details clearly on the answer books.
2. Write your Admission No on the question paper.
3. Be precise and clear in answering the questions.
4. Support your answer with necessary diagrams and examples.

Q1 Answer the following questions: (03 marks each)

[15]

1. Write a PROLOG program for a forest fire detector system. The readings are obtained from the temperature sensor in terms of list of integers in degree Celsius unit. The detector is supposed to print the message "Warning!!" as soon as the temperature reading obtained from sensor is greater than 200 degree Celsius.
2. State the advantages of predicate logic over propositional logic. Given the english facts:
 - Rita is 21 years old.
 - Every Indian who is more than 18 years can vote.
 - Rita and Sita belong to India.
 - Rita and Sita are twin sisters.

Convert the above facts into predicate logic and CNF form.

3. Differentiate between rule-based programming languages over functional programming languages.
4. Solve the following using PROLOG program for railway reservation system:
The database has entries of the customer and their trains in following format:
Reservation(Traveler (Name, Contact_No.), Train(Train_no., Train_name, Source, Destination, Date of Travel(dd,mm,yyyy), Total Fare, Reservation Status))
 1. Print the names of Travelers having trains on 6th March 2020 having 'Confirm (CNF)' as Reservation Status.
 2. Print all the trains from 'Surat' to 'Mumbai' having fare less than 1000.
 3. Display all details of travelers having reservation status as 'Waiting (WL)'.
5. Prove the following statement: "It is dangerous to use red cut in PROLOG as compared to white and green cuts". Support your proof by suitable example.

Q2 Answer the following questions:

[17]

1. Explain the significance of using # in functional programming. What do you mean by higher-order functions? Explain the use of # for higher-order functions with an example of LISP program. (03)
2. State the difference between pure and impure functions. Also explain when aliasing can be helpful in a program? (03)

3. Explain dotted list in LISP programming. State its usage. Also differentiate association list with dotted list along with example. (03)
4. Write a LISP program to display the all the odd prime numbers between 1 to 25. (03)
5. How many types of abstraction are possible in a programming language? List and explain them at each of the different levels. (03)
6. State difference between the following functions (with examples for each): (02)
 1. *asserta* and *assertz*
 2. *setof* and *bagof*

Q3 Answer the following questions:(03 marks each)

[18]

1. How can user-defined operator overloading in C++ harm the readability of a program? Explain.
2. What are the characteristics of co-routine feature? List the languages which allow co-routines.
3. Explain the criteria of success for a good programming language.
4. Declare a template class called *exam* having an array of generic type as a data member, named *elements* [10]. Define following generic (template) member functions: (Implement in C++/JAVA):
 - *Sort* to arrange elements in ascending order.
 - *Find_max* to find and return maximum from the array.
 Define main to illustrate usage of these functions to process two different types of data.
5. Create a class in C++ coordinate containing x, y and z private data members. Perform operations for incrementing, adding and comparing objects by overloading ++, += and == operators respectively. Define necessary functions to set and display the variables.
6. Explain friend function and its characteristics. Define a class matrix in C++ with an integer array of 3X3 as a data member. Define a friend function which adds two matrix objects and returns resultant matrix object.

Computer Engineering Department, SVNIT - Surat

End Semester Examination - December- 2019

B.Tech. IV – VII Semester

Course: Principles of Programming Languages (CO405)

Date: 4th December 2019 Time: 15:30 hrs to 18:30 hrs

Max Marks: 50

Instructions:

1. Write your Admission No/Roll No and other details clearly on the answer books.
2. Write your Admission No on the question paper.
3. Be precise and clear in answering the questions.
4. Support your answer with necessary diagrams and examples.

Q1 Answer the following questions: (03 marks each)

[15]

1. What do you mean by *Quoting* and *Quasi-quoting*? State the usage of *Quoting* and *Quasi-quoting* in LISP Programming along with example for each.
2. Do programming environment affects the formulation of Program? Justify your answer.
3. Write a macro in LISP to multiply each number in a given list by five. Take integer list from user. Also explain how working of macros differs from functions in LISP.
4. Write a PROLOG Program which separates strings of the odd length and even length in different files odd.txt and even.txt respectively. Take list of strings as input from user.
5. Differentiate Array and Hash-Table in LISP. Make a hash-table of vehicles. Enter the following details for vehicles: company name and vehicle name (Eg: company name: Honda vehicle: Activa). Write a LISP Program to do the following:
 1. Find all vehicles of Honda Company.
 2. Change the name of Activa to Activa5G.

Q2 Answer the following questions: (03 marks each)

[15]

1. Write a LISP Program to make a voting system. Define the instances of voters (minimum 4) and candidates (minimum 2) using structure. Calculate total number of votes for each candidate in a voting system and declare the winner having maximum votes. Voters can input candidates ID via command line for voting. Also state advantages of using structure over association list in LISP programming.
2. Explain the distinction between Imperative Programming and Declarative Programming. What are the comparative advantages and disadvantages of both the approaches?
3. State the use of following functions in LISP along with example for each.
 1. *progn*
 2. *lambda*
 3. *mapcar*
 4. *find-if*
 5. *getf*
 6. *let**

4. Explain *modes ponens* and *substitution* operation for Logic Programming along with example. Is Propositional Logic better than Predicate Logic? Justify.
5. State and explain three string manipulating functions in LISP programming. Given the list of celestial objects: Sun, Moon, Stars, Planets, Asteroids and Meteors. Write LISP program to input the given list from user (command-line). Also write functions to perform the following:
 1. Fetch-out and print fourth element from the list.
 2. Find and print items at even positions from list.

Q3 Answer the following questions:

[20]

1. What are the characteristics of co-routine feature? List the languages which allow co-routines. (2)
2. Write a generic C++ function that takes an array of generic elements and a scalar of the same type as the array elements. The type of the array elements and the scalar is the generic parameter. The function must search the given array for the given scalar and return the subscript of the scalar in the array. (3)
3. Write a JAVA/C++ program to print all permutations of a given String. For example, if given String is "GOD" then your program should print all 6 permutations of this string, e.g. "GOD," "OGD," "DOG," "GDO," "ODG," and "DGO." (3)
4. What is the need of an activation record in implementing a subprogram? Explain with an example. (3)
5. You need to design a Vending Machine which (3)
 - Accepts coins of 1, 5, 10, 25 Cents i.e. penny, nickel, dime, and quarter.
 - Allow user to select products Coke (25), Pepsi (35), Soda (45)
 - Allow user to take refund by canceling the request.
 - Return selected product and remaining change if any
 - Allow reset operation for vending machine supplier.

Designing a vending machine in Java or C++, you have to use basics of language e.g. Encapsulation, Polymorphism or Inheritance and also use subtle details such as abstract class and interface.
6. Differentiate and also write about similarities between procedure oriented programming languages and object oriented programming languages. List all the features of object oriented programming languages. (3)
7. Write a program in C++/JAVA. Given an array of integers, you have to find all pairs of elements in this array such that whose sum must be equal to a given number. If {4, 5, 7, 11, 9, 13, 8, 12} is an array and 20 is the given number, then you have to find all pairs of elements in this array whose sum must be 20. In this example, (9, 11), (7, 13) and (8, 12) are such pairs whose sum is 20. Time complexity should be $O(n \log n)$. (3)

Computer Engineering Department, SVNIT, Surat.
Mid Semester Examination, September-October - 2019

B.Tech IV - VII Semester

Course: Principles of Programming Languages (CO405)

Date: 3rd October 2019

Time: 16:00 hrs to 17:30 hrs

Max Marks: 30

Instructions:

1. Write your Admission No/Roll No and other details clearly on the answer books.
2. Write your Admission No on the question paper.
3. Be precise and clear in answering the questions.
4. Support your answer with necessary diagrams and examples.

Q1 Answer the following questions

1. Given the following facts: [6]
i) If X is on top of Y then Y is carrying X. (3)
ii) X is above Y and if they are touching each other than X is exactly on top of Y.
iii) A pen is above a book.
iv) A pen is touching a book.
a) Convert all above English facts to CNF Form.
b) Using Resolution method, find the answer of "Is book carrying a pen"?
2. Given the following facts: (3)
i) John doesn't study.
ii) John is lucky.
iii) Anyone is lucky wins the lottery.
iv) Anyone passing his Engineering exams and winning the lottery is happy.
v) Everyone who studies or is lucky can pass all his exams.
a) Represent all above English facts in Predicate Logic.
b) Write all clauses in PROLOG clause form.
c) Write PROLOG query corresponding to the question "Is John happy?" and state steps which PROLOG follow to answer it.

Q2 Answer the following questions

1. Write a PROLOG program for checking an alphanumeric password: Consider user is given opportunity to re-enter password for 3 times, if entered incorrect. [14] (2)
2. Write a PROLOG program to generate Fibonacci series up to N terms. Take N from user and store the output in a file named 'dbl.txt'. (2)
3. Can fail predicate be used for looping in PROLOG? Justify your answer. (2)
4. State difference between '!' and '\+' notation in PROLOG. (2)

5. Consider following clauses written in PROLOG having data about customers. (6)
 Structure format of each customer is as follows: *customer(customer_id, customer_name, [item(item name, purchase price in rupees)])*
customer(c1,ram,[item(keyboard,300), item(mouse,200), item(laptop,50000)]).
customer(c2,mohit,[item(bag,600), item(watch,1200), item(keyboard,550)]).
customer(c3,gita,[item(mouse,330), item(bag,700), item(iphone,90000)]).

Solve the following using PROLOG program:

- Total number of items purchased by each customer.
- List name of all customers who have purchased more than one item.
- Find total purchase price *bag* for all given customers.
- List all unique items purchased by all the customers.
- Find the costliest item and name of customer who purchased it.
- Name all the customers who have purchased *mouse*.

Q3 Answer the following questions

1. Design a class named *Fan* to represent a fan. The class contains: [10]
 (5)
- Three constants named *SLOW*, *MEDIUM* and *FAST* with values 1, 2 and 3 to denote the fan speed.
 - An int data field named *speed* that specifies the speed of the fan (default *SLOW*).
 - A boolean data field named *f_on* that specifies whether the fan is on (default false).
 - A double data field named *radius* that specifies the radius of the fan (default 4).
 - A data field named *color* that specifies the color of the fan (default blue).
 - A no-arg constructor that creates a default fan.
 - A parameterized constructor initializes the fan objects to given values.
 - A method named *display()* will display description for the fan. If the fan is on, the *display()* method displays speed, color and radius. If the fan is not on, the method returns fan color and radius along with the message "fan is off".

Write a test program in (C++/Java) that creates two Fan objects. One with default values and the other with medium speed, radius 6, color brown, and turned on status true. Display the descriptions for two created Fan objects.

2. Write a (C++) program to sort an array of 0's, 1's and 2's in linear time (5)
 complexity. Given an array consisting only 0's, 1's and 2's. Sorting an array in $O(n)$ time complexity (in the sorted array, 0's will be at starting, then the 1's & then the 2's).
