Exam Code: 0917
Sub. Code: 6789

2021
B.E. (Computer Science and Engineering)
Fifth Semester
CS-504: Principles of Programming Languages

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questionsfrom each Unit.

x-x-x

I. Answer the following:-

a) How many distinct parse trees can an ambiguous grammar generate for a string which is accepted by the grammar?

b) What is concurrent programming? Why concurrency is needed?

c) What is independent compilation?

d) Type conversion provides more flexibility to the user. Comment on it.

e) Why is there no assignment operation in pure functional programming? (5x2)

UNIT-I

11. Consider following BNF grammar. The start symbol is <Pedigree>

<Pedigree> ~ <Name>

<Pedigree> ~ <Name><Parents>

<Parents> ~<Person><Person>

<Person> ~ () | (<Pedigree>)

<Name> ~<Letter> <Letter><Name>

<Letter> ~A | ... | Z a | ... | z

For each of the following, indicate whether the string belongs to the language recognized by this grammar or not and if it does belong to the language, give a derivation:

a) Charles()

b) Charles (Elizabeth)

c) Charles(() Philipp)

d) Charles () (Philipp)

e) Charles (Elizabeth) (Philipp) (5x2)

P.T.O.

III. What is Overloading? Differentiate context-independent and context-dependent overloading? Differentiate between function overloading and operator overloading? How can a method be overridable in JAVA and C++? (10)

IV. a) Explain back tracking. What is meant by cut? What is its use?

b) Discuss various synchronization primitives in concurrent programming. (2x5)

UNIT-II

V. a) Suppose the heap is managed with a linked list. Each node in the list is either allocated or free. The list is sorted by address. When malloci) is called, the list is searched for a free segment that is big enough (depending on the allocation algorithm), that segment is split into an allocated segment (at the beginning) and a free segment. When free() is called, the corresponding segment should merge with its neighboring segments, if they are also free. Now suppose a process has a heap of l3KB, which is initially unallocated. During its execution, the process issues the following memory allocate/deallocate calls (pl...p5 are void* pointers). In all cases, break ties by choosing the earliest segment. Also, assume all algorithms allocate memory from the beginning of the free segment they choose.

pl =malloc(3KB)
p2 = malloc(4KB)
p3 = malloc(3KB)
free(p2)
p4=malloc(3KB)
free(pl)

p5 = malloc(IKB). For simplicity, assume the memory begins at address 0, and ignore the memory used by the linked list itself. Show the heap allocation after the above calls, using best-fit, worst-fit and first-fit algorithms respectively. Identify the starting address ofp4 and p5 for best-fit, worst-fit and first-fit.

b) Briefly explain Reference Counting. What are its disadvantages? (6,4)

VI. a) Explain different Polymorphic data types with the help of suitable examples.

b) Discuss "type inference" and "type checking" in functional programming. (2x5)

VII. a) Explain Procedural, Generic and Data abstraction in C++.

b) Write the different classes of exceptions in Java.

c) What features of PRO LOG classify it as a logic programming language? (5,3,2)

x-x-x