

**III B. Tech I Semester Regular Examinations, November - 2015**  
**PRINCIPLES OF PROGRAMMING LANGUAGES**

(Computer Science and Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answering the question in **Part-A** is compulsory  
 3. Answer any **THREE** Questions from **Part-B**

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**PART -A**

- |   |    |  |      |
|---|----|--|------|
| 1 | a) | What constitutes a programming environment?  | [3M] |
|   | b) | What mixed-mode assignments are allowed in C and Java?   | [4M] |
|   | c) | What is an alias? What are the problems associated with it?  | [4M] |
|   | d) | What is attribute grammar? Explain how attribute grammar is use for evaluation of the expressions. | [4M] |
|   | e) | What is type inferencing used in ML?   | [3M] |
|   | f) | What is the difference between checked and unchecked exception in java?                            | [4M] |

**PART -B**

- |   |    |  |       |
|---|----|--|-------|
| 2 | a) | What is the difference between a sentence and a sentential form in a CFG?  | [4M]  |
|   | b) | Explain with an example how the weakest precondition for a logical pretest loop is derived.  | [8M]  |
|   | c) | A concise and understandable description of a programming language is essential to the language's success. Comment on this.  | [4M]  |
| 3 | a) | What are the merits of sub range types?  | [3M]  |
|   | b) | Explain in detail various design issues of character string types.   | [8M]  |
|   | c) | What is a variable and what are the attributes of a variable? Elaborate on address of a variable.  | [5M]  |
| 4 | a) | Discuss the following term:<br>i) Dangling pointers, ii) Tail recursion elimination.   | [10M] |
|   | b) | Explain associative arrays, their structure and operations.  | [6M]  |
| 5 | a) | What is the difference between the way original C and C89 deal with an actual parameter whose type is not identical to that of the corresponding formal parameter? | [8M]  |
|   | b) | Discuss in detail overloaded operators.  | [8M]  |
| 6 |    | Discuss how producer-consumer problem and Dining philosopher's problem are solved using concurrency in ADA.  | [16M] |
| 7 | a) | For what sort of application logic programming is useful? Briefly explain.   | [8M]  |
|   | b) | What are existential queries? Briefly explain.   | [8M]  |

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**PART -A**

- 1 a) What do you mean by a general purpose language? Is C a general purpose language? [3M]  
 b) Give an example of left recursive rule in CFG. What is the significance of left recursive rule? [4M]  
 c) What do you mean by binding? Give examples of some of the bindings and their binding times. [4M]  
 d) Consider the following C program: [4M]  

```
int fun(int _ i) {
    *i+=5;
    return 4;
}
void main {
    int x=3;
    x=x+fun (&x)
}
```

 What is the value of x after assignment statement in main method assuming i. operands are evaluated left to right?  
 e) What are advantages and disadvantages of dynamic local variables? [3M]  
 f) What is type inferencing used in ML? [4M]

**PART -B**

- 2 a) Explain the process of compilation in each phase of a compiler. [8M]  
 b) Give some reasons why computer scientists and professional software developers should study general concepts of language design and evaluation. [8M]
- 3 a) Discuss about Context-free grammar and regular expression? Give the parse tree of a following statement:  $A = (B+C) * (D / E)$ . [8M]  
 b) Consider the following pseudo code. [8M]  

```
Procedure P (A, B: real)
X: real
Procedure Q (B, C: real)
Y: real
...
Procedure R (A, C: real)
Z: real
... (*)
...
```

 Assuming static scope, what is the referencing environment at location marked by (\*)?



- 4 a) Explain in detail arrays, indices, subscript bindings, and array categories. [8M]  
b) What are the problems posed by managing a heap of single-size cell and variable-size cell? Explain in detail various methods for reclaiming garbage. [8M]
- 5 a) Discuss precedence and associativity rules of different programming languages. [8M]  
b) Explain in detail multiple selection constructs. [8M]
- 6 a) What are the characteristics of co-routine feature? List the languages which allow co-routines. [8M]  
b) How to implement generic functions in C++? [8M]
- 7 a) Define monitor? Explain how cooperation synchronization and competition synchronization are implemented using monitors. [8M]  
b) Write a prolog description of your family tree (based only on facts), going back to your grandparents and including all descendants. Be sure to include all relationships. [8M]

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**PART -A**

- |   |    |   |      |
|---|----|---|------|
| 1 | a) | Differentiate between Hybrid Interpretation and Pure Interpretation.                | [3M] |
|   | b) | Write short notes on Short Cut evaluation.  | [4M] |
|   | c) | What are the design issues for exception handling in JAVA?                          | [3M] |
|   | d) | Differentiate In mode and Out Mode parameter passing mechanisms.                    | [4M] |
|   | e) | With respect to the object oriented programming, briefly explain virtual functions. | [3M] |
|   | f) | What are the three features of Haskell that makes very different from schema?       | [4M] |

**PART -B**

- |   |    |  |      |
|---|----|--|------|
| 2 | a) | What are the main features of the programming paradigm with examples?  | [8M] |
|   | b) | Define CFG? What does it mean for CFG to be ambiguous?   | [8M] |
| 3 | a) | (i) Explain Dijkstra's selection construction and loop structure.  | [8M] |
|   |    | (ii) Explain with examples user-located loop control mechanisms provided by various languages.   |      |
|   | b) | What is meant by type checking? Differentiate between static type checking and dynamic type checking and give their relative advantages. | [8M] |
| 4 | a) | Discuss the significance of holes in the records. Why they do and what problem do they cause?  | [8M] |
|   | b) | Explain the difference between virtual and non-virtual methods.  | [8M] |
| 5 | a) | Describe three alternative means of allocating co-routine stacks. What are their relative strengths and weaknesses?                      | [8M] |
|   | b) | What is dangling-else problem? Discuss How it can be handled by the programming language.  | [8M] |
| 6 |    | Explain the following terms :  |      |
|   | a) | Message passing  | [6M] |
|   | b) | Concurrency in Ada   | [5M] |
|   | c) | Monitors.  | [5M] |
| 7 | a) | For what sort of application logic programming is useful? Briefly explain.   | [8M] |
|   | b) | Write a LISP function fib(n) that computes nth Fibonacci number.   | [8M] |

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**PART -A**

- |   |  |      |
|---|--|------|
| 1 | a) Briefly write about Virtual Machines.   | [3M] |
|   | b) What are the advantages of user-defined data types?                                       | [4M] |
|   | c) How does C support relational and Boolean expressions?                                    | [3M] |
|   | d) Explain with example how operand-evaluation order interacts with functional side effects. | [4M] |
|   | e) Write a short note on 'this' pointer in C++.  | [3M] |
|   | f) Explain about LISP interpreter.   | [4M] |

**PART -B**

- |   |   |       |
|---|---|-------|
| 2 | Explain language evaluation criteria and the characteristics that affect them.  | [16M] |
| 3 | a) Define syntax and semantics.   | [5M]  |
|   | b) The levels of acceptance of any language depend on the language description. Comment on this.  | [5M]  |
|   | c) Define grammars, derivation and a parse tree.  | [6M]  |
| 4 | a) What are dangling pointers and lost heap-dynamic variables? How are they created?  | [8M]  |
|   | b) What are the problems posed by managing a heap of single-size cell and variable-size cell? Explain in detail various methods for reclaiming garbage. | [8M]  |
| 5 | Discuss about the various attributes of a good language and explain the process of evaluating attributes with example.                                  | [16M] |
| 6 | a) Write an analysis of the similarities and differences between java packages and C++ namespaces.  | [8M]  |
|   | b) Explain how information hiding is provided in an ADA package.  | [8M]  |
| 7 | a) Discuss about basic elements of prolog. Give examples.   | [8M]  |
|   | b) Explain how data abstraction is implemented in ADA.  | [8M]  |

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