



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## COMPUTER SCIENCE AND ENGINEERING

### TUTORIAL QUESTION BANK

Course Name	PRINCIPLES OF PROGRAMMING LANGUAGES
Course Code	A50511
Class	III B. Tech I Semester
Branch	CSE
Year	2017 – 2018
Course Faculty	Ms. K. Radhika, Associate Professor, CSE Ms. B. Jaya Vijaya, Assistant Professor, CSE Mr. P. Sunil Kumar, Assistant Professor, CSE

### OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S No	QUESTION	Blooms taxonomy level	Course Outcomes
<b>UNIT-I</b>			
<b>Part - A (Short Answer Questions)</b>			
1	<b>Define</b> programming language?	Knowledge	1
2	<b>Differentiate</b> between sentence and sentential form?	Understand	2
3	<b>Define</b> Syntax and Semantics?	Knowledge	5
4	<b>Differentiate</b> between Syntax and Semantics?	Understand	5
5	<b>Write</b> BNF notation for i) For loop ii) if-else condition	Understand	5
6	<b>Describe</b> grammars for simple assignment statements?	Understand	5
7	<b>Describe</b> unambiguous grammar for if-then-else?	Understand	5
8	<b>Define</b> Parse trees?	Knowledge	5
9	<b>Define</b> De-notational semantics?	Knowledge	5
10	<b>Define</b> Operational semantics?	Knowledge	5
11	<b>Define</b> Axiomatic semantics?	Knowledge	5
12	<b>Differentiate</b> compiler and interpreter?	Understand	3
13	<b>Describe</b> language recognizers?	Knowledge	3
14	<b>Describe</b> generators?	Knowledge	3
15	<b>Distinguish</b> simplicity and orthogonality?	Understand	2
16	<b>Discuss</b> object oriented programming?	Understand	8
17	<b>List</b> out the programming environments?	Knowledge	4

18	<b>Define</b> programming domains?	Knowledge	4
19	<b>List</b> language categories?	Knowledge	6
20	<b>Write</b> reasons for studying concepts of programming languages?	Understand	1
21	<b>Which</b> part of an inference rule is the antecedent?	Knowledge	5
22	<b>When</b> a grammar rule said to be left recursive?	Knowledge	5
23	<b>List</b> out the example of an ambiguous grammar?	knowledge	5
24	<b>Define</b> BNF notation?	Knowledge	6
25	<b>Define</b> syntax Graphs?	Knowledge	4
<b>Part - B (Long Answer Questions)</b>			
1	<b>Discuss</b> language evaluation criteria and the characteristics that affect them?	Understand	1
2	<b>List</b> the potential benefits of studying programming language concept?	Knowledge	1
3	<b>Explain</b> syntax of a “for” statement in PASCAL using BNF Notation and syntax graphs?	Understand	5
4	<b>Explain</b> syntax of declaration statement in PASCAL using BNF notation and syntax graphs?	Understand	5
5	<b>Calculate</b> the weakest precondition for each of the following simple assignment statements and post conditions? i. $a=2*(b-1)-1 \{a>0\}$ ii. $b=(c+10)/3 \{b>6\}$ iii. $a=a+2*b-1 \{a>1\}$ iv. $X=2*y+x-1 \{x>11\}$	Apply	5
6	<b>Write</b> the syntax and semantics of each term and draw BNF notation for the following: a) For loop b) If-else condition c) Structure definition	Understand	5
7	<b>Define</b> left most derivation? Prove that the following grammar is ambiguous? $\langle \text{program} \rangle \rightarrow \text{begin} \langle \text{stmt\_list} \rangle \text{end}$ $\langle \text{stmt\_list} \rangle \rightarrow \langle \text{stmt} \rangle$ $\quad \quad \quad \langle \text{stmt} \rangle ; \langle \text{stmt\_list} \rangle$ $\langle \text{stmt} \rangle \rightarrow \langle \text{var} \rangle = \langle \text{expression} \rangle$ $\langle \text{var} \rangle \rightarrow A   B   C$ $\langle \text{expression} \rangle \rightarrow \langle \text{var} \rangle + \langle \text{var} \rangle$ $\quad \quad \quad \langle \text{var} \rangle - \langle \text{var} \rangle$ $\quad \quad \quad \langle \text{var} \rangle$	Knowledge	5
8	<b>State</b> the given grammar is ambiguous? $\langle \text{assign} \rangle \rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle$ $\langle \text{id} \rangle \rightarrow A   B   C$ $\langle \text{expr} \rangle \rightarrow \langle \text{expr} \rangle + \langle \text{expr} \rangle$ $\quad \quad \quad \langle \text{expr} \rangle * \langle \text{expr} \rangle$ $\quad \quad \quad \langle \text{expr} \rangle$ $\quad \quad \quad \langle \text{id} \rangle$	Knowledge	5
9	<b>List</b> the three general methods of implementing a programming language?	Knowledge	3
10	<b>Explain</b> different aspects of the costs of a programming language?	Understand	1
11	<b>Discuss</b> about the various programming domains and their associative languages?	Understand	1
12	<b>Demonstrate</b> the readability and write ability contradict with each other? Explain with an example?	Knowledge	1
13	<b>Compare</b> Procedure oriented and object oriented programming. Explain the object oriented features supported by C++?	Understand	3
14	a. <b>Explain</b> Parse trees with an example? b. <b>Design</b> parse trees for the following expressions i) $A:=B+C+A$ ii) $A:=B*(A+C)$	Understand	3
15	<b>Define</b> ambiguous and unambiguous grammar and list out their	Knowledge	5

	differences?		
16	<b>Define</b> program language features?	Knowledge	5
17	<b>Explain</b> any 4 application languages?	Understand	1
<b>Part – C (Problem Solving and Critical Thinking)</b>			
1	<b>Illustrate</b> some reasons why computer scientist and professional software developers should study general concepts of language design and evaluation?	Apply	1
2	<b>Write</b> reasons for the statement: “Exception handling is very important, but often neglected by programming languages”?	Understand	2
3	<b>Analyze</b> the reasons for the statement: “A programming language can be compiled or interpreted”. Give relative advantages and disadvantages of compilation and interpretation. Give examples of compiled and interpreted languages?	Analyze	3
4	<b>Write</b> EBNF descriptions for the following i. A Java class definition header statement ii. A Java method call statement iii. A „C“ switch statement iv. A „C“ Union definition v. A „C“ float literals	Understand	3
5	<b>Explain</b> recursive Descent Processing?	Understand	3
<b>UNIT-II</b>			
<b>Part - A (Short Answer Questions)</b>			
1	<b>Define</b> named constants?	Knowledge	6
2	<b>Define</b> associative arrays?	Knowledge	6
3	<b>Explain</b> numeric types?	Understand	6
4	<b>Distinguish</b> named type and structure type compatibility?	Understand	6
5	<b>List</b> the merits of sub range types?	Knowledge	6
6	<b>Differentiate</b> union and enumeration?	Understand	6
7	<b>Define</b> data type?	Knowledge	6
8	<b>List</b> the merits of type checking?	Knowledge	6
9	<b>Define</b> user defined data type?	Knowledge	6
10	<b>Define</b> widening and narrowing conversions?	Knowledge	6
11	<b>Define</b> a pointer?	Knowledge	6
12	<b>Write</b> the design issues of character string type?	Understand	6
13	<b>Explain</b> about strings and their operations?	Understand	6
14	<b>Evaluate</b> strings?	Evaluate	6
15	<b>List</b> the design issues of array types?	Knowledge	6
16	<b>Define</b> rectangular and jagged arrays?	Knowledge	6
17	<b>Evaluate</b> the arrays?	Evaluate	6
18	<b>List</b> the design issues of pointers?	Knowledge	6
19	<b>Explain</b> about dangling pointers?	Understand	6
20	<b>Write</b> the common problems with pointers?	Understand	6
21	<b>Define</b> the primitive data types supported by C language?	Knowledge	6
22	<b>Define</b> Heap-dynamic Array?	Knowledge	6
23	<b>Illustrate</b> Slice of an array?	Knowledge	6
24	<b>Define</b> Keyword and list out few?	Knowledge	6
25	<b>Define</b> type checking?	knowledge	6
<b>Part - B (Long Answer Questions)</b>			
1	<b>Define</b> heterogeneous array? Discuss the design issues of arrays?	Knowledge	3
2	<b>Explain</b> in detail the design issues of arithmetic expressions?	Understand	3
3	<b>Discuss</b> structural and name equivalence for types? Give an example of a language used for each approach?	Understand	6
4	<b>Define</b> a variable and what the attributes of a variable are? Elaborate on address of a variable?	Knowledge	6

5	<b>Write</b> a note on Boolean and relational expressions?	Understand	6
6	<b>Explain</b> the different types of relational operators used in C, Ada and Fortran 95?	Understand	6
7	<b>Discuss</b> the advantages and disadvantages of mixed mode arithmetic expressions?	Understand	6
8	<b>Define</b> array and record? Classify arrays based on storage allocation? What are the advantages and disadvantages of allocation memory during compilation time and run time?	Knowledge	6
9	<b>Define</b> static, fixed stack dynamic, stack dynamic, fixed heap dynamic and dynamic arrays? What are the advantages of each?	Knowledge	6
10	<b>List</b> and explain the design issues of pointers?	Knowledge	6
11	<b>Define</b> data type. Why every programming language supports different data types?	Knowledge	
12	<b>Explain</b> in details various design issues of character string types?	Understand	6
13	<b>Define</b> slice of an array? Explain with the help of an example?	Knowledge	6
14	<b>Discuss</b> precedence and associativity rules of different programming languages?	Understand	6
15	<b>Discuss</b> various control statements in programming languages?	Understand	6
<b>Part – C (Problem Solving and Critical Thinking)</b>			
1	<b>List</b> what advantages does java's break statement have over C's and C++'s break statement?	Knowledge	8
2	<b>State</b> whether static binding is more reliable or dynamic binding. Explain why?	Knowledge	7
3	<b>Differentiate</b> union and array types?	Understand	6
4	<b>Explain</b> the concept of binding in detail?	Understand	6
5	<b>Explain</b> in detail primitive data types?	Understand	6
6	<b>Explain</b> in detail Record, types, references to record fields, operations on records?	Understand	6
<b>UNIT-III</b>			
<b>Part - A (Short Answer Questions)</b>			
1	<b>Define</b> scope and lifetime of a variable?	Knowledge	7
2	<b>Differentiate</b> shallow and deep binding?	Understand	7
3	<b>Define</b> subprogram?	Knowledge	7
4	<b>Define</b> procedures?	Knowledge	7
5	<b>Define</b> local referencing environment?	Knowledge	7
6	<b>Differentiate</b> static and dynamic binding?	Understand	7
7	<b>Define</b> static scope?	Knowledge	7
8	<b>Define</b> dynamic scope?	Knowledge	7
9	<b>Evaluate</b> static scoping?	Evaluate	7
10	<b>Evaluate</b> dynamic scoping?	Evaluate	7
11	<b>List</b> the subprogram characteristics?	Knowledge	7
12	<b>Distinguish</b> different types of parameters?	Understand	7
13	<b>Differentiate</b> procedures and functions?	Understand	7
14	<b>Define</b> pass by value?	Knowledge	7
15	<b>Discuss</b> overloaded subprograms?	Understand	7
16	<b>Define</b> pass by result?	Knowledge	7
17	<b>Differentiate</b> ad hoc and parametric polymorphism?	Understand	7
18	<b>Define</b> pass by reference?	Knowledge	7
19	<b>List</b> the design issues of functions?	Knowledge	7
20	<b>Define</b> quasi concurrency?	Knowledge	7
21	<b>Define</b> functions?	Knowledge	7
22	<b>List</b> out the Local variable types?	Knowledge	7
23	<b>Differentiate</b> static variable and static dynamic local variable?	Understand	7
24	<b>Define</b> type checking?	Knowledge	7
25	<b>Define</b> overloaded operator?	Knowledge	7

<b>Part - B (Long Answer Questions)</b>			
1	<b>Define</b> subprograms? What are the advantages of subprograms? Explain different methods of parameter passing mechanisms to subprograms?	Knowledge	7
2	<b>Explain</b> the design issues of subprograms?	Understand	7
3	<b>Discuss</b> about procedures and functions in subprograms?	Understand	7
4	<b>Define</b> shallow and deep binding for referencing environment of sub programs that have been passed as parameters?	Knowledge	7
5	<b>Discuss</b> with suitable examples static and dynamic scope?	Knowledge	7
6	<b>Discuss</b> generic subprograms in C++?	Understand	8
7	<b>Explain</b> about Co routines?	Understand	7
8	<b>Discuss</b> generic subprograms in java?	Understand	8
9	<b>Discuss</b> the importance of Co-routines of Lua language?	Understand	7
10	<b>Discuss</b> the importance of generic subprograms?	Understand	8
11	<b>Explain</b> general problem with static scoping?	Understand	7
12	<b>Define</b> block? How scope of a variable is dependent on block?	Knowledge	8
13	<b>Explain</b> how c language deals with scope of the variables?	Understand	7
14	<b>Demonstrate</b> advantages and disadvantage of dynamic local variables?	Understand	8
15	<b>Explain</b> how multi-dimensional arrays are passed as parameters?	Knowledge	7
<b>Part – C (Problem Solving and Critical Thinking)</b>			
1	<b>Compare</b> the parameter passing mechanisms of ALGOL and ADA?	Apply	7
2	<b>State</b> the importance of Local Referencing Environments with suitable examples?	Knowledge	2
3	<b>Discuss</b> about different parameter passing methods of Ada language?	Understand	7
4	<b>Demonstrate</b> implementation of parameter passing methods in detail?	Knowledge	7
5	<b>Explain</b> side effect related to evaluation of expression and conditional expression of c language?	Apply	7
<b>UNIT-IV</b>			
<b>Part - A (Short Answer Questions)</b>			
1	<b>Define</b> an exception?	Knowledge	9
2	<b>Define</b> a thread?	Knowledge	9
3	<b>Define</b> concurrency?	Knowledge	9
4	<b>Define</b> binary semaphore?	Knowledge	9
5	<b>Define</b> monitors?	Knowledge	9
6	<b>Define</b> mutual exclusion?	Knowledge	9
7	<b>Define</b> deadlock?	Knowledge	9
8	<b>Define</b> an abstract data type?	Knowledge	8
9	<b>Define</b> logic programming language?	Knowledge	10
10	<b>Define</b> data abstraction?	Knowledge	8
11	<b>Write</b> about message passing?	Understand	9
12	<b>List</b> the design issues for abstract data types?	Knowledge	8
13	<b>Write</b> about object oriented programming in small talk?	Understand	8
14	<b>Evaluate</b> java threads?	Evaluate	9
15	<b>List</b> the design issues for object oriented languages?	Knowledge	8
16	<b>Define</b> rule and goal statements of prolog?	Knowledge	10
17	<b>Evaluate</b> C# threads?	Evaluate	9
18	<b>Compare</b> exception handling in java with C++?	Understand	8
19	<b>Write</b> the applications of logic programming?	Understand	10
20	<b>Define</b> terms and fact statements of prolog?	Knowledge	10
21	<b>Differentiate</b> java packages and c++ namespaces?	Understand	10
22	<b>List</b> out the features of abstract Data types?	Knowledge	8
23	<b>Define</b> polymorphism?	Knowledge	9
24	<b>Define</b> passing parameters?	Knowledge	8
25	<b>Define</b> semaphore?	Knowledge	8

<b>Part - B (Long Answer Questions)</b>			
1	<b>Describe</b> how exception is handled in ADA with an example?	Knowledge	9
2	<b>Describe</b> briefly about Semaphores?	Knowledge	9
3	<b>Describe</b> briefly about Monitors?	Knowledge	9
4	<b>Discuss</b> Object Oriented Programming in SMALLTALK?	Understand	8
5	<b>Write</b> about goal statements and simple arithmetic in PROLOG?	Understand	10
6	<b>Define</b> binary semaphore. What is counting semaphore? What are the primary problems with using semaphores to provide synchronization?	Knowledge	9
7	<b>Explain</b> the following terms: i. process synchronization ii. race condition iii. binary semaphores iv. MIMD	Understand	9
8	<b>Explain</b> different types of propositions present in logic programming?	Understand	10
9	<b>Describe</b> the cooperation synchronization and competition synchronization in message passing?	Knowledge,	9
10	<b>Discuss</b> how dining philosopher's problem and producer consumer problem are solved using concurrency in Ada?	Understand	9
11	<b>Discuss</b> analysis of the similarities and differences between java packages and c++ namespaces?	Understand	9
12	<b>Explain</b> the object-oriented programming support in java?	Understand	10
13	<b>Discuss</b> what way c++ „throw „specification differs from throw clause in java?	Understand	9
14	<b>Demonstrate</b> between checked and unchecked exceptions in java?	Knowledge	9
15	<b>Explain</b> about the applications of logic programming?	Understand	9
<b>Part – C (Problem Solving and Critical Thinking)</b>			
1	<b>Discuss</b> the reasons for using exception handlers in a programming language. What if there exist programming languages with no exception handlers?	Understand	8
2	<b>Write</b> the sample code to factorial of a number in PROLOG language?	Understand	10
3	<b>Analyze</b> the importance of logic programming languages over functional programming languages?	Analyze	11
4	<b>Discuss</b> how parameter passing techniques are implemented and explain type checking techniques?	Understand	11
5	<b>Explain</b> binary semaphore? Define cooperation synchronization and competition synchronization in semaphore?	Understand	11
<b>UNIT-V</b>			
<b>Part - A (Short Answer Questions)</b>			
1	<b>Explain</b> lazy evaluation?	Understand	8
2	<b>Define</b> procedural abstraction?	Knowledge	8
3	<b>List</b> few characteristics of Python language?	Knowledge	12
4	<b>Define</b> functional language?	Knowledge	11
5	<b>Define</b> imperative language?	Knowledge	11
6	<b>Explain</b> scripting language?	Understand	12
7	<b>List</b> few examples of scripting languages?	Knowledge	12
8	<b>List</b> keywords of Python language?	Knowledge	12
9	<b>List</b> data types of Python language?	Knowledge	12
10	<b>Define</b> the term separate compilation in Python?	Knowledge	12
11	<b>Define</b> referential transparency?	Knowledge	11
12	<b>List</b> the draw backs of using an imperative language to do functional programming	Knowledge	11
13	<b>Write</b> about first list interpreter?	Understand	11
14	<b>Write</b> the general form of function declaration in ML?	Understand	11
15	<b>Define</b> list comprehensions in Haskell?	Knowledge	11
16	<b>Write</b> about python variables?	Understand	12

17	<b>Define</b> data abstraction?	Knowledge	12
18	<b>Explain</b> about storage and control of python?	Understand	12
19	<b>Define scope</b> in python?	Knowledge	12
20	<b>Write</b> the syntax of selection control flow construct in ML?	Understand	11
21	<b>Define</b> functional programming?	Knowledge	8
22	<b>Compare</b> imperative languages and functional languages?	Understand	12
23	<b>Define</b> control?	Knowledge	12
24	<b>Define</b> separate compilation?	Knowledge	12
25	<b>Define</b> module library?	Knowledge	12
<b>Part - B (Long Answer Questions)</b>			
1	<b>Write</b> about control constraints in Python?	Understand	12
2	<b>Write</b> about data abstraction in Python?	Understand	12
3	<b>Write</b> about data types and structures of LISP and LISP interpreter?	Understand	11
4	<b>List</b> the ways in which ML is significantly different from scheme?	Knowledge	11
5	<b>Describe</b> the scoping rule in common LISP, ML and HASKELL?	Knowledge	11
6	<b>Explain</b> the characteristics of scripting languages?	Understand	12
7	<b>Discuss</b> in detail about the python primitive types?	Understand	12
8	<b>Explain</b> about LISP functional programming language?	Understand	11
9	<b>Discuss</b> and trace the Python code to find the factorial of a number?	Understand	12
10	<b>Discuss</b> and trace the Python code to print the Fibonacci series between the given ranges of numbers?	Understand	12
11	<b>Explain</b> about simple functions in mathematical functions?	Understand	12
12	<b>Draw</b> the internal representation for the following LISP statements. i. (A B C D) ii. (A(B C)D(E(F G)))	Knowledge	12
13	<b>Explain</b> structures and arrays in ML .give examples?	Understand	12
14	<b>Define</b> scripting languages list out the characteristics of scripting languages?	Understand	12
15	<b>Discuss</b> about procedural and data abstraction? Give an example?	Understand	12
<b>Part – C (Problem Solving and Critical Thinking)</b>			
1	<b>Write</b> features of Haskell that makes very different from schema?	Understand	11
2	<b>List</b> the ways in which ML is significantly different from schema?	Knowledge	11
3	<b>Compare</b> the advantages of Python scripting language over other scripting languages?	Apply	12
4	<b>Illustrate</b> Python code with example to find the roots of quadratic equation?	Apply	12
5	<b>Explain</b> 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 relationship?	Apply	12

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