

**Arab Academy For Science and Technology & Maritime
Transport**

College of Engineering & Technology

Computer Engineering Department



EXAMINATION PAPER – Week 7

Course Title: Advanced Programming Languages

Course Code: CC711

Date: Fri. April, 22-2016

Lecturer: Dr. Manal Helal

Time allowed: 2 Days

Start Time: 10:30 a.m.

Reg.#:

Student's name:

Question #

Marks

Available

Actual

Programming Languages

6

Syntax

4

Semantics

5

Variables & Data Types

10

Total

25

Lecturer

Name: Dr. Manal Helal

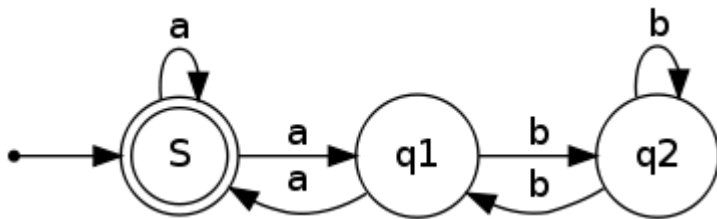
Signature:

Date:

ALL MCQ are worth 1 mark each.

1) What arguments can you make for the idea of a single language for all programming domains? What arguments can you make against the idea of a single language for all programming domains? **[1 points]**

2) Using the finite automata shown in the figure, please answer the following questions: **[3 points]**



i) Please write example strings that can be recognised by the shown automata, and explain Why?

ii) Please determine whether the shown automata can recognise any of the following tokens:.

- | | |
|-----------|---------|
| a. ababab | b. aabb |
| c. aabbaa | d. abba |
| e. a | f. aaaa |

iii) Can you summaries this automata in fewer states?

3) Research a comparison of the facilities of Fortran 0 with those of the Laning and Zierler system. **[2 points]**

Syntax

[4 points]

4) Write EBNF descriptions for the following:

[2 points]

- a. A Java class definition header statement
- b. A Java method call statement
- c. A C switch statement
- d. C float literals

5) Compute the weakest precondition for each of the following assignment statements and postconditions:

[2 points]

- a. $a = 2 * (b - 1) - 1 \{a > 0\}$
- b. $b = (c + 10) / 3 \{b > 6\}$
- c. $a = a + 2 * b - 1 \{a > 1\}$
- d. $x = 2 * y + x - 1 \{x > 11\}$

Semantics

[5 points]

6) Given the following grammar and the right sentential form, draw a parse tree and show the phrases and simple phrases, as well as the handle. [3 points]

$S \rightarrow AbB$ bAc $A \rightarrow Ab$ aBB $B \rightarrow Ac$ cBb c

- aAcccbbc
- AbcaBccb
- baBcBbbc

7) Show a complete parse, including the parse stack contents, input string, and action for the string $(id + id) * id$, using the following grammar and the following parse table [2 points]

- $E \rightarrow E+T$
- $E \rightarrow T$
- $T \rightarrow T * F$
- $T \rightarrow F$
- $F \rightarrow (E)$
- $F \rightarrow id$

State	Action						Goto		
	id	+	*	()	\$	E	T	F
0	S5			S4			1	2	3
1		S6				accept			
2		R2	S7		R2	R2			
3		R4	R4		R4	R4			
4	S5			S4			8	2	3
5		R6	R6		R6	R6			
6	S5			S4				9	3
7	S5			S4					10
8		S6			S11				
9		R1	S7		R1	R1			
10		R3	R3		R3	R3			
11		R5	R5		R5	R5			

Variables**[10 points]**

8) Some programming languages are typeless. What are the obvious advantages and disadvantages of having no types in a language? [2 points]

9) Consider the following JavaScript skeletal program: [3 points]

```
// The main program var x;  
function sub1() {  
    var x;  
    function sub2() { ...  
    }  
}  
function sub3() { ...  
}
```

Assume that the execution of this program is in the following unit order:

main calls sub1

sub1 calls sub2

sub2 calls sub3

a. Assuming static scoping, in the following, which declaration of x is the correct one for a reference to x?

- i. sub1
- ii. sub2
- iii. sub3

b. Repeat part a, but assume dynamic scoping.

10) Write a Common LISP program that clearly shows the difference between static and dynamic scoping. [3 points]

11) Write three functions in C or C++: one that declares a large array statically, one that declares the same large array on the stack, and one that creates the same large array from the heap. Call each of the subprograms a large number of times (at least 100,000) and output the time required by each. Explain the results.

[2 points]