

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
DECEMBER EXAMINATIONS 2001

SUBJECT: LANGUAGE FORMALISM AND SOFTWARE METHODOLOGY
CODE: SCS 4103

INSTRUCTION TO CANDIDATES

Answer any five (5) questions
Each question carries 20 marks

LIBRARY USE ONLY

Time: 3 hours

QUESTION ONE

A computer with 4-bit instruction and 12-bit mantissa including one bit for sign has to be programmed in machine language for computing the following expression:

$$\frac{((x+a) - c)^d}{(x+a)}$$

Assuming the following instruction set, write a machine language program and also show the data store, intermediate result storage and final result in machine code language when $x=5$, $a=4$, $c=3$ and $d=2$.

Instruction set

0000 ---- data	0101 ---- add
0001 ---- read	0110 ---- subtract
0010 ---- write	0111 ---- multiply
0011 ---- move	1000 ---- divide
0100 ---- store	1001 ----exponential
1111 ---- end	

[20]

QUESTION TWO

Explain briefly the following terms in relationship to programming. Include in your explanation the merits and demerits of each.

- a) Machine language [4]
- b) Assembly language [4]
- c) Macro [4]
- d) High level language [4]
- e) stubs [4]

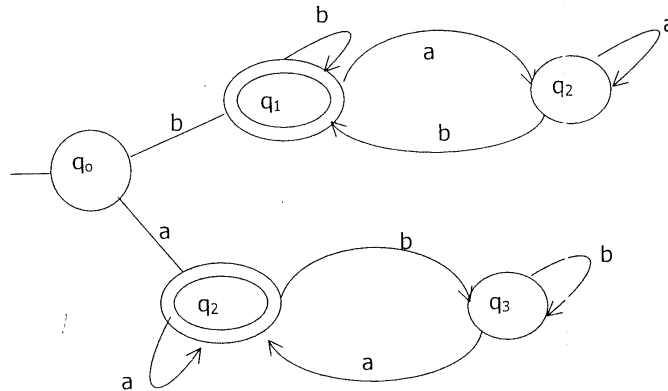
QUESTION THREE

- a) With the help of a diagram outline the phases of the compiler. [10]
- b) Compare and contrast FORTRAN compiler and C compiler. [10]

QUESTION FOUR

For the transition diagram given below:

- a) Write a code for it. [14]
- b) Describe fully the machine defined by that transaction diagram [6]



QUESTION FIVE

Explain how a Non Finite Deterministic Automata can be converted to finite deterministic automata [20]

QUESTION SIX

With the help of an example illustrate how the stack implementation of shift-reducing Parsing operates. [20]

QUESTION SEVEN

The Parsing table for an LR parser for the grammar

- i) $E \rightarrow E + T$
- ii) $E \rightarrow T$
- iii) $T \rightarrow T * F$
- iv) $T \rightarrow F$
- v) $F \rightarrow (E)$
- vi) $F \rightarrow id$

is shown in figure 7.1

STATE	ACTION						GOTO		
	1d	+	*	()	\$	E	T	F
0	S5				S4		1	2	3
1		S6				acc			
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			

Show the sequence of stack and input contents of the moves made by the parse on input 1d*1d+1d. [20]

END OF QUESTION PAPER

GOOD LUCK!