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**Fifth Semester B.E. Degree Examination, Dec.2013/Jan.2014**  
**System Software**

Time: 3 hrs.

Max. Marks:100

*Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.*

**PART – A**

- 1 a. Bring out the differences between system software and application softwares, with examples. (04 Marks)
  - b. Explain the SIC / XE machine architecture in detail. (12 Marks)
  - c. Suppose that RECORD contains a 100 byte record. Write a subroutine for SIC / XE that will write this record onto device FI. Use immediate addressing and register-to-register instructions to make the subroutine as efficient as possible. (04 Marks)
- 2 a. Write and explain the algorithm for a PASS-1 of a two-pass assembler. (10 Marks)
  - b. Generate the complete object program for the source program given below:

```

SUM      START  0
FIRST    LDX    #0
          LDA    #0
          +LDB  #TABLE2
          BASE  TABLE2
LOOP     ADD    TABLE, X
          ADD    TABLE2, X
          TIX   COUNT
          JLT   LOOP
          +STA  TOTAL
          RSUB
COUNT  RESW   1
TABLE   RESW  2000
TABLE2  RESW  2000
TOTAL   RESW   1
          END   FIRST
  
```

Assume the below opcodes for mnemonics.

(10 Marks)

Mnemonic	Opcode
ADD	18
JLT	38
LDA	00
LDB	68
LDX	04
RSUB	4C
STA	0C
TIX	2C

- 3 a. Distinguish between literal and immediate operands. How does the assembler handle the literal operands? (05 Marks)

- 3 b. Assuming the following symbol table definitions:

Symbol	Type
BUFFER	Relative
FIRST	Relative
MAXLEN	Absolute
LENGTH	Relative
BUFEND	Relative

Classify the following into absolute, relative or neither absolute nor relative expressions:

- (i) BUFFER – FIRST (ii) BUFFER + 4095  
 (iii) MAXLEN – 1 (iv) BUFFER + MAXLEN – 1  
 (v) BUFFER – MAXLEN (vi) 2 \* LENGTH  
 (vii) 2 \* MAXLEN – 1 (viii) MAXLEN – BUFFER  
 (ix) FIRST + BUFFER (x) FIRST – BUFFER + BUFEND (05 Marks)
- c. Give the formats of the following records:  
 (i) Define record (ii) Refer record (04 Marks)
- d. Write the schematic of symbol table entries that shows how multipass assembler handles the following forward references:

```

1 HALFSZ EQU MAXLEN / 2
2 MAXLEN EQU BUFEND – BUFFER
3 BUFFER RESB 2048
4 BUFEND EQU *
```

Assume that when line 3 is read, the location counter contains the hexadecimal value 750.

- (06 Marks)
- 4 a. Write the SIC/XE source code for a simple bootstrap loader. (07 Marks)  
 b. Explain dynamic linking with suitable diagrams. (07 Marks)  
 c. Explain the facilities available in MS-DOS linker for program linking. (06 Marks)

### **PART – B**

- 5 a. With a neat diagram, explain the structure of a text editor. (10 Marks)  
 b. Explain the debugging functions and capabilities of an interactive debugging system. (06 Marks)  
 c. Write a note on the concept of user-interface criteria in a text editor. (04 Marks)
- 6 a. Explain the various data structures used in the implementation of a macro processor. (08 Marks)  
 b. Explain the following machine-independent macro processor features with examples:  
 (i) Concatenation of macro parameters.  
 (ii) Generation of unique labels.  
 (iii) Keyword macro parameters. (12 Marks)
- 7 a. Explain the communication between the Parser and Lexer with a neat block diagram. (05 Marks)  
 b. What is a regular expression? Explain the various regular expressions in UNIX with examples for each. (10 Marks)  
 c. Write a LEX program to count the number of vowels and consonants in a given string. (05 Marks)
- 8 a. Explain the structure of a YACC program. (06 Marks)  
 b. Write a YACC program to recognize an arithmetic expression involving operators +, -, \* and /. (08 Marks)  
 c. What is shift / reduce parsing? Explain with an example. (06 Marks)

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